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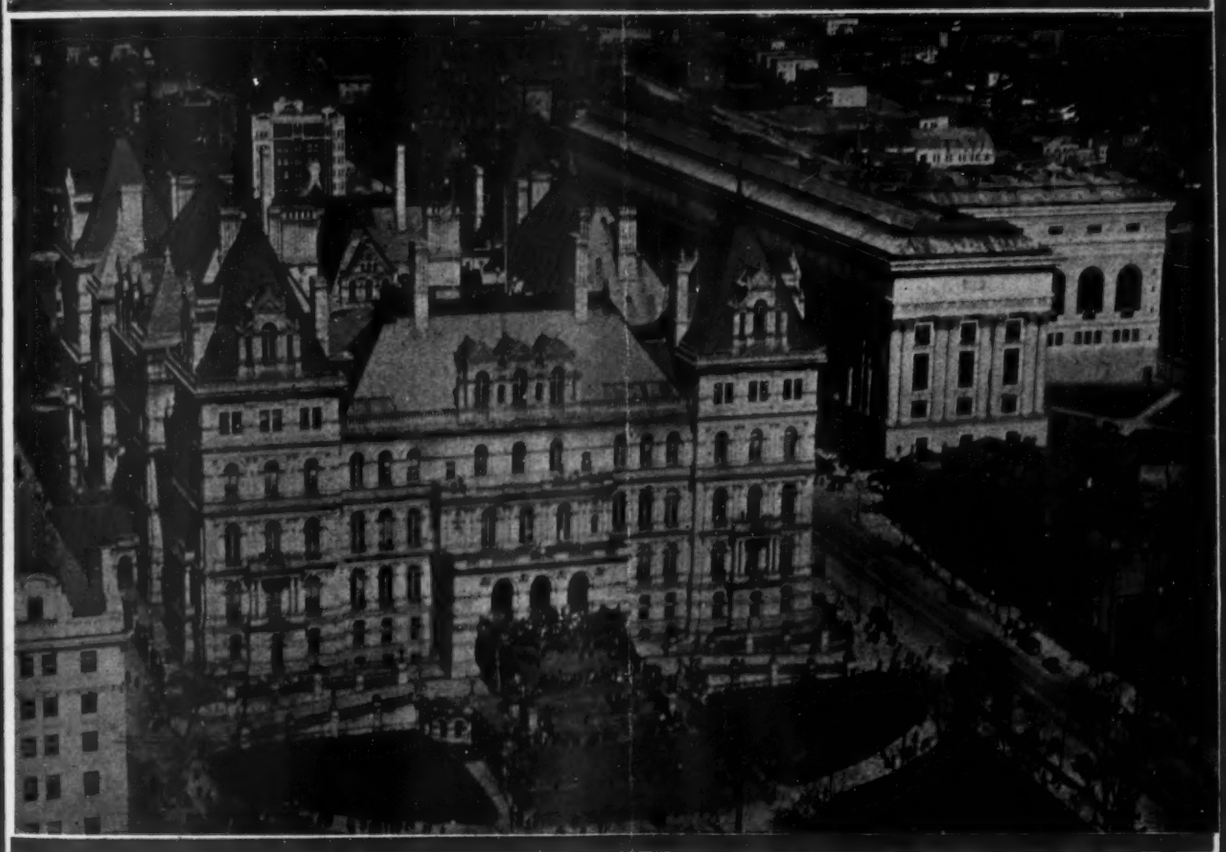
AVIATION AND AIRCRAFT JOURNAL



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VOLUME XI
Number 19

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SPECIAL FEATURES

A NEW LANGLEY CONTROVERSY
THE J. L. 12 ARMORED ATTACK AIRPLANE
TRIALS OF SPERRY HIGH-LIFT WING
APPLYING THE FIGURE OF MERIT
THE AIR TRANSPORT FLIGHTS AT MINEOLA

THE GARDNER, MOFFAT CO., INC.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

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FACTS ON FLYING BOAT TRANSPORTATION

First Annual Report of Commercial Aviation Operations ever made in the United States compiled by the Aeromarine Airways for the Bureau of Aeronautics, Navy Department, Washington, D. C. For the Year ending October 27th, 1921.

From: AEROMARINE AIRWAYS, Inc.
1800 Times Bldg., New York City.

To: ADMIRAL W. A. MOFFETT,
Director of Naval Aviation,
Navy Building,
Washington, D. C.

Subject: First Annual Report of Commercial Flying Operations.

TOTALS

Passengers carried	6,814
Miles flown	95,020
Accidents	NIL
Mail and freight	29,002

The operation of the Aeromarine-Navy flying boats in the commercial transportation of passengers, mail and freight for the period commencing October 27, 1920 and ending October 27, 1921, is herewith submitted.

1. Six eleven-passenger flying cruisers of F5L type in operation carried 1,044 passengers 42,000 miles in the air and transported 24,002 lbs. of mail and 5,000 lbs. of freight and baggage, exclusive of crews.
2. Six Navy Coast Patrol five-passenger flying boats of HS2L type carried 4,762 passengers 34,920 miles in the air, exclusive of crews.
3. Three Aeromarine three-place flying boats carried 1,008 passengers 18,100 miles, exclusive of pilots.
4. Not a single passenger or employee was injured during these operations. The schedule was maintained throughout with the exception of four forced landings during adverse weather conditions which caused only slight delays. These delays were less than those suffered by railroads in slight snowstorms. The flying boat "NINA" was torn from her moorings one night in Havana Harbor during a terrific gale, blown against some rocks and damaged beyond repair. No one was aboard at the time.
5. The services maintained include Key West - Havana; Florida - Bahama Islands; New York, Atlantic City and New England ports; New York Sight Seeing; New York - Albany; Great Lakes region; Mississippi River Valley.

SUMMARY

The eleven-passenger Navy F5L flying boats operated in the Key West - Havana Service during the Winter months, after which four of them were laid up for the Summer. The remaining boat, "SANTA MARIA" then undertook a flight from Key West up the Atlantic Coast to New York, up the Hudson River, over Lakes George and Champlain to Montreal, along the Great Lakes to Chicago and thence by way of the Illinois and Mississippi Rivers to New Orleans, thence along the Gulf to Key West, a total distance of 7,000 miles.

Of the six HS2 flying boats four were in constant operation and two were in reserve. One of these boats made a complete circumnavigation of the Great Lakes flying 7,491 miles and carrying 500 passengers; another covered the New England States.

For operations during the coming year six of the Aeromarine-Navy eleven-passenger flying cruisers will be placed in operation on the Key West-Havana route and between Palm Beach and Miami and Bimini and Nassau; two other flying cruisers of the same type will be held in reserve for special chartered parties.

For the other services seven of the five-passenger Aeromarine-Navy HS2 type will be placed in active operation and ten others will be held in reserve for special charters.

Three of the Aeromarine three-place flying boats will be used for special services and special charters, with two of these same types held in reserve.

Very truly yours,
AEROMARINE AIRWAYS, Inc.,
(Signed) C. F. REDDEN
President.

The Aeromarine Airways is today the largest Aerial Transportation Company in the world operating flying boats exclusively.

The experience gained in the successful operation of aircraft for commercial purposes, representing an investment of many hundreds of thousands of dollars, is furnished to purchasers of Aeromarine Flying Boats. There is no other Aerial Transportion Company in North America that has this information available.

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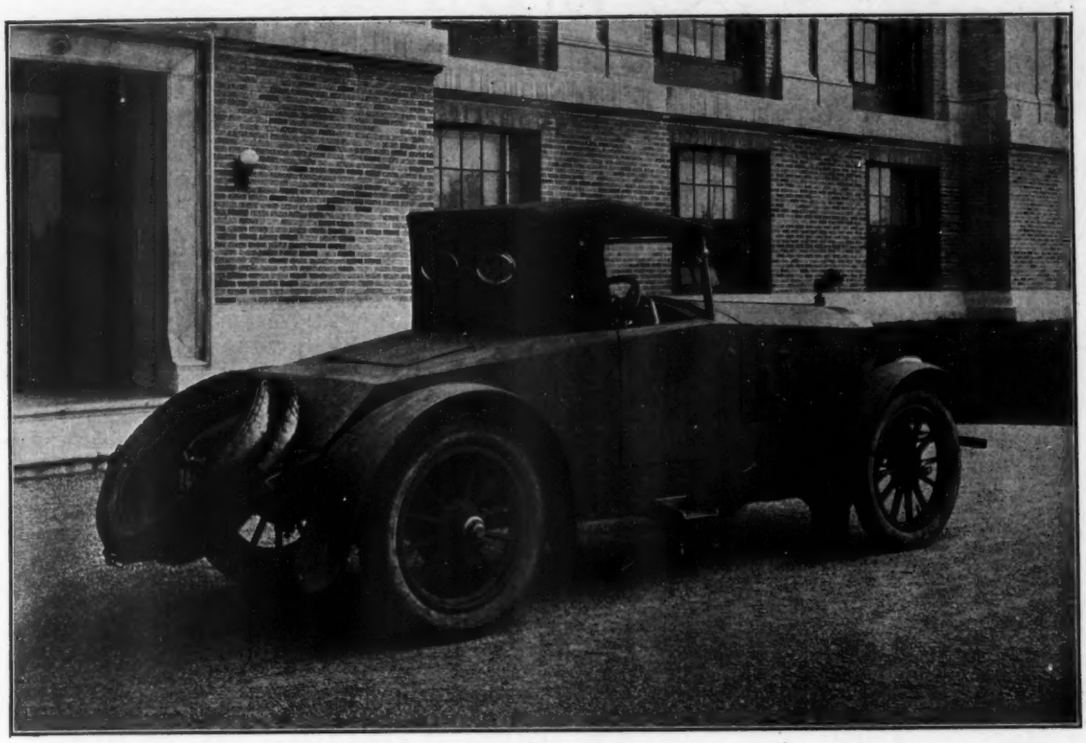

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AVIATION AND AIRCRAFT JOURNAL

NOVEMBER 7, 1921 VOL. XI. NO. 19

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AVIATION AND AIRCRAFT JOURNAL

LADISLAS D'ORCY, EDITOR
ALEXANDER KLEMIN
EDWARD P. WARNER
RALPH H. UPSON, CONTRIBUTING EDITORS

Vol. XI NOVEMBER 7, 1921 No. 19

Dispersion versus Unification

IT is not generally known that a score or more departments or bureaus of the government are all appearing before General Dawes to urge aeronautical appropriations in connection with their various activities. The list of the government agencies is truly impressive, as may be seen from the brief enumeration which follows.

The War Department naturally heads the list, but beside the needs of the Air Service many other requests for aeronautical appropriations appear in the estimates of this department. Thus, the Fortifications Bill has its aviation requirements. The Sundry Civil Bill and the well known Legislative, Executive and Judicial Bill look after the pay of the personnel. The Quartermaster Department, the Ordnance Department and the Signal Corps have likewise aeronautical requirements.

The Navy, until the Bureau of Aeronautics was established had its requirements for naval appropriations scattered through half a dozen bureau requests. The new organization makes it possible to have a single naval air appropriation, which considerably simplifies its study.

The Post Office Appropriation Bill carries the U. S. Air Mail needs. The National Advisory Committee for Aeronautics makes its requests independently. The Bureau of Standards, the Weather Bureau and the Government Printing Office have their aeronautical work provided for in separate bills.

This brief and incomplete enumeration shows the extraordinary dispersion of aeronautical provisions which prevails in the present government machinery. In seeking a remedy for this unfortunate state of affairs Great Britain affords the example of a separate air department which controls all military and naval air activities, and supervises and supports civil air transport. In France, on the other hand, the air services of the army and navy are separate organizations, but the aircraft engineering and construction service is unified under a sub-secretary of aeronautics. The latter establishes the aeronautical estimates in accordance with the requirements of the respective services, and he also controls civil air transport and the national meteorological office. While this system of concurrently establishing the military and naval air estimates may be somewhat involved, it appears to give satisfaction, so that it should appeal to those who are opposed to a separate air department and a single air service.

The three-unit ministry of defense, with under-secretaries for the Army, Navy and a separate Air Force yet to be created, which the Administration sponsors, would probably be the best solution of the problem.

A great many people are reluctant to place the control of civil aeronautics into the hands of the military for fear that such a solution might result in regulations which would have less regard for the commercial interests of air transport than for its military adaptability in time of war. This is why it seems to us preferable to have a bureau of civil air transport in the Department of Commerce rather than in the proposed Ministry of Defense under an under-secretary of aeronautics. The latter's duties will necessarily be military in the first place, the term military being used in the sense of opposed to civil, and as he will be in charge of both army and naval aeronautics, these duties are likely to be of considerable magnitude. Hence, if civil air transport were put under his control it is to be feared that the under-secretary of aeronautics would find little time to take deep interest in problems which are primarily commercial.

Third Aviators' Armistice Dinner

THE annual Aviators' Armistice Dinner which was instituted by the now defunct American Flying Club in 1919 and which was perpetuated by the Aero Club of America when the two organizations joined forces, threatened this year to bring about a new rift in our aviation circles. For a time it seemed indeed as if the year 1921 would see two aviators' armistice dinners—a juncture which would have been highly regretted by all those who work for a closer and more cordial union of all aeronautical interests.

It is therefore gratifying to note that, thanks to the earnest efforts of both sides to come to an agreement the difficulties which threatened to split the Aviators' Dinner in two have been composed. Hence there will be but one Armistice celebration on Nov. 11, at the Commodore Hotel. The dinner has the unqualified support of both the Aero Club of America and of Laurence L. Driggs, chairman of the committee which planned the Armistice Dinner independently. It is to be hoped that all fliers who can do so will celebrate Armistice Day at the Aviators' Dinner so as to make it the biggest and most successful aeronautical gathering of its kind.

Aviation Recognition

THE appointment of Rear Admiral Moffet and Brigadier General Mitchell to the Technical Advisory Board at the Washington Conference for the Limitation of Armaments is of the greatest significance. Aviation, which hitherto seemed to be dominated by the older services, for the first time takes its seat at the conference table with spokesmen who know the importance of the new arm and are able to speak of it in intelligent terms.

Other governments are sending to Washington their air department representatives, and it was therefore generally feared that our own air services would, as heretofore, be represented by some ranking officer of the senior services. That the ablest aeronautical men in the Army and in the Navy were chosen for this post gives hope that out of the conference may come some readjustment which will give our air services a renewed importance and a more clearly recognized value.

A New Langley Controversy

Griffith Brewer Reopens Discussion at Scientific Meeting in London

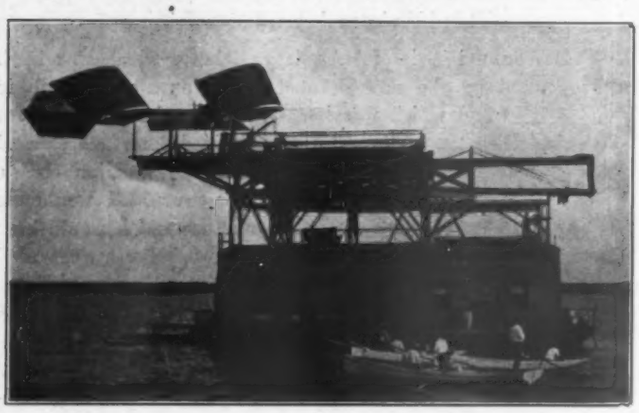
In a long and carefully illustrated paper Mr. Griffith Brewer has reopened the controversy regarding the accomplishments in aeronautical history of S. P. Langley, one-time secretary of the Smithsonian Institution. The paper and the illustrations would require too much space for reproduction in full in our columns, but the summary which is printed below brings out the main points under discussion.

The paper was sent in advance by the Royal Aeronautical Society to Dr. Charles D. Walcott, of the Smithsonian Institution, and to Dr. Charles M. Manly, who had charge of the engine experimental work for Langley. Their comment on this new controversy is printed below following the summary of Mr. Brewer's paper.

Summary of Griffith Brewer's Paper

Since the publication of the Smithsonian report, Langley has been widely accepted as the pioneer of aviation, and Langley is now widely credited with having invented and constructed the first man-carrying aeroplane capable of sustained free flight.

The Smithsonian Institution has always attributed the failure of the Langley machine in 1903 to a failure in the launching apparatus, and it has hitherto been generally accepted that the machine was wrecked without having had a fair opportunity to prove whether it was capable of flight. It is easy, therefore, to understand that since the Wrights,



LANGLEY'S FULL-SIZED FLYING MACHINE ON ITS LAUNCHING PLATFORM IN THE POTOMAC

who had been working on the same problem, succeeded where Langley had failed, Langley's friends eagerly welcomed the suggestion made ten years later that it might still be possible to prove the Langley machine was capable of flight.

If Langley's machine could be flown, one of the most dramatic events in the history of aviation would be accomplished! Langley and the Wrights had been working concurrently, hundreds of miles apart, for several years, and both had approached the final stage of their independent experiments at the same time. Langley tested his machine a few weeks before the Wrights were ready to test theirs, and the attempts to fly the Langley machine failed. The Wrights, one week after Langley's second attempt, tested theirs and succeeded. Was it merely a mishap which robbed Langley of the credit of being the first to fly, or did he fail because the machine he had built was not capable of flight?

It is not surprising, therefore, that when Glenn Curtiss offered to fly the old Langley machine, Secretary Walcott, who had succeeded Professor Langley as Secretary of the Smithsonian Institution, should have welcomed the opportunity to have Langley's machine tested. It cannot be denied, however, that it was unwise to accept Mr. Curtiss' offer to carry out the tests, because the Curtiss Aeroplane Co. has just been adjudged an infringer of the Wright patent, and Mr. Curtiss obviously might have had other motives than merely the vindication of Langley. It certainly was not proper to appoint Dr. Zahm to represent the Smithsonian Institution, when he was known to have been the technical expert witness for the Curtiss Aeroplane Co. in its former suits, and when he was about to represent the Curtiss Co. in another infringement suit, in which these tests were to play a most important part. This, however, was the situation, and is verified by the fact that although Dr. Zahm says that the Smithsonian Institution agreed to pay the costs of the experiments, none of the costs apart from the carriage of the machine to Hammondsport have ever been paid by the Institution.

****

This reconstructed machine is now exhibited in the U. S. National Museum with the following inscription:—

ORIGINAL LANGLEY FLYING MACHINE, 1903

The first man-carrying aeroplane in the history of the world capable of sustained free flight. Invented, built, and tested over the Potomac River by Samuel Pierpont Langley in 1903. Successfully flown at Hammondsport, N. Y., June 2, 1914.

****

It is not reasonable to attribute the collapse of the wings to a failure of the launching mechanism, a mechanism which Mr. Langley states had been used most successfully in more than a dozen launchings of models, when there were several perfectely good reasons why the wings would collapse under any conditions of launching.

The wings of the Langley machine had but a slight factor of safety as was shown in the sand tests of the wings as described on page 203 of the Langley Memoir. When a sand load of only 20 per cent above the flying stress was imposed, most of the ribs were bent from 12 to 13 in. out of shape. Langley could not make the wings stronger, because he considered the machine already as heavy as it could be, if free flight was to be attained. And it is clearly impossible to launch such a machine using an outside force to give it initial momentum without subjecting it to greater stresses than it would be subjected to in normal flight. On the other hand the machine could not carry its own launching device because this slight extra weight would prevent it from flying at all. It should be remembered that the machine had been designed and tested with a view of standing the stresses of flight only. Being rigidly held down to the carriage in launching, it was forcibly prevented from rising into the air when it had attained the necessary speed for flight. But the stress on the wings of the machine so bound down increased as the square of the speed of the machine with referenc to the air, and the wings therefore may have been subjected to excessive pressure before the machine was released at the end of the track.

****

I think I have said sufficient here to show the technical members of the Society that the failure of the original Langley machine was due to the collapse of the wings owing to their frailty and to bad engineering in placing the guy posts so far forward of the cenre of pressure. The fact that the wings were subject to much greater stress during the time the machine was held down to the launching car, than it would have experienced if it had been free to rise, is surely sufficient reason for the failure of the machine, without assuming the additional accident of the guy posts catching in the launching apparatus. I will not, therefore, labor this point, especially as I am now going to show, when comparing the Langley machine with the Hammondsport machine, that Dr. Zahm and Mr. Curtiss apparently knew of these fatal mistakes in the design of the Langley machine, and attempted to correct them when building the Hammondsport machine.

****

SUMMARY

It is untrue to say that Langley's machine of 1903 ever has flown or ever could fly. In both trials in 1903 the wings collapsed through faults in design of the machine, and not from any failure in the launching mechanism.

The machine used at Hammondsport in 1914 differed from the original Langley machine in many important respects.

The wings were of different area, different camber and different aspect ratio.

The system of wing trussing, which in the Langley machine had failed, was completely changed at Hammondsport.

The large keel surface of the Langley machine was altogether omitted.

The Langley system of launching was abandoned, and a system developed after his death was used in its place.

The original Langley propellers were modified and afterward superseded by a modern propeller, based on knowledge not possessed by Langley.

A system of lateral control unknown to Langley was added. The dihedral angle of the wings on which Langley relied entirely for maintaining lateral balance was supplemented in the Hammondsport machine by the action of a rudder of increased size used as an aileron.

The steering wheel, post and shoulder yoke of a modern Curtiss machine were installed complete in the Hammondsport machine.

The original Langley engine of 52 hp. was at first modified and afterward superseded by a modern Curtiss motor of 80-100 hp.

At first it was necessary to change the machine to carry the engine, and then it was necessary to change the engine to carry the machine. Finally there was neither the original Langley engine nor the original Langley machine.

The remains of the Langley machine were at last returned to the Smithsonian Institution, and were entrusted to Mr. Reed for restoration to the original form of 1903. Mr. Reed did his work well, for when I saw the rebuilt Langley in the National Museum last April, it was very much like Langley built it. The wings had their leading edges restored, thus bringing them back to their former camber and area; the wings were stayed to the old guy posts, which were set forward again to their original but ineffective positions; the Langley propellers were restored; the pilot's car was again under the forward part of the frame; the Curtiss control gear had been removed. In fact, the whole machine had lost all appearance of having been out on an indiscreet adventure.

The present paper, however, does not deal with Langley's work except so far as is necessary in order to disprove the wild assertions made by pretended friends in order to build up for their own ends a credit for Langley which could not be enduring, a credit which Langley would be the first to repudiate were he here to do so. No fraud can long endure when so much evidence is on record. If it had not been my privilege to bring these facts before you, some other inquirer would have dug up the evidence at some later time and done the service to Langley I have done in separating his upright life from association with anything which is not strictly true or honorable.

Criticism by Charles M. Manly

Charles M. Manly, one-time assistant to Dr. Langley in charge of engine development, offers in part the following criticism of Mr. Brewer's paper:

I would have been amazed at the contents of this paper by Mr. Griffith Brewer had I not upon reading it, immediately recalled the great similarity between a large portion of the statements made in it and the very bald statements made in the affidavit of Mr. Orville Wright in the suit of the Wright Co. vs. the Curtiss Aeroplane Co. in 1915, in which Mr. Wright claimed for himself and his brother the credit for everything that had

been achieved in aviation from the beginning of time, and had dismissed everything that went before as "mere speculation and theory excepting", as he described it, "the desultory experiments of men like Lilienthal and Chanute with powerless gliding machines, and like Maxim, Ader and Prof. Langley with miniature models and experimental full-sized machines which never flew, nor were capable of flight." In fact, it appears, upon a review of this affidavit of Mr. Orville Wright, that the present paper by Mr. Brewer is merely a condensed statement of the assertions, arguments, speculations and errors of this affidavit by Mr. Wright.

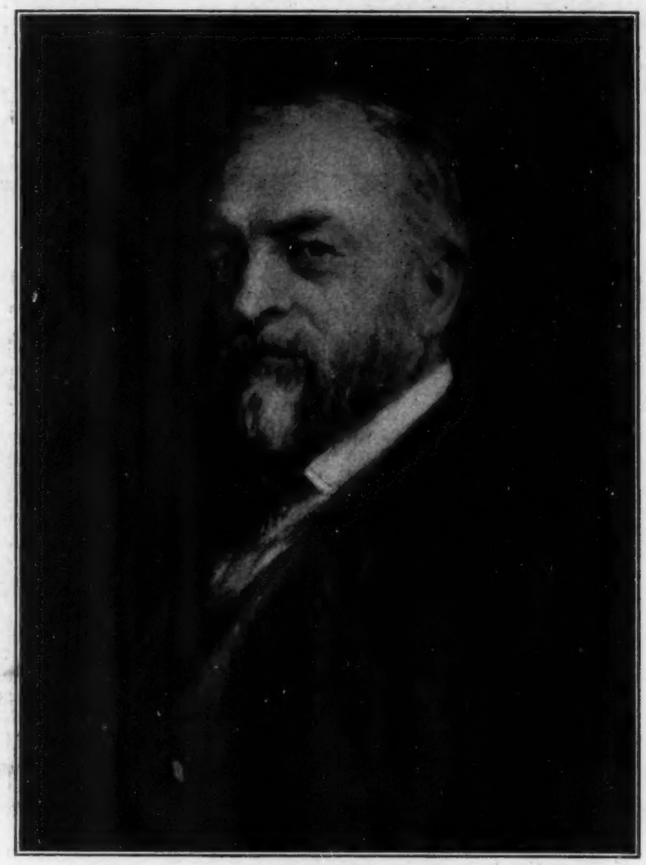
Before discussing Mr. Brewer's paper in detail, I wish to say that there is no one more willing and anxious to give due credit to Mr. Orville Wright, and his late-lamented brother, Mr. Wilbur Wright, for the brilliancy of their achievement in building the first machine that actually transported a human being through the air in controlled flight, as well as for being the first to actually fly in such a machine, and also for their great ability and pluck in achieving these results entirely through their own resources. I do deny, however, that the machine which they built and with which they accomplished the first flight was the first full-size machine capable of controlled flight, and I do assert that the Langley machine, which was built prior to theirs, was capable of successfully transporting a human being through the air and being controlled in such flight, and that it was prevented in 1903 from actually demonstrating its ability to achieve this result entirely through unfortunate accidents in connection with the two launchings which were made of it, and not through any inherent weakness, inefficiency, lack of power, or lack of any essential element necessary to the securing of such a result.

It must be rememberd, in connection with the large Langley machine, that the general plans for it had been settled by Dr. Langley prior to my becoming associated with him in June, 1898. Also that these plans called for this large machine to be as near a duplicate as possible, on an enlarged scale, of the two steam-driven models which had so successfully flown in 1896 and which were approximately one-quarter the linear dimensions of this large machine. While Dr. Langley had, from the beginning of the undertaking, felt that it was necessary to replace the steam power plants of the successful models of 1896 with an internal combustion engine, and recognized the securing of such a power plant as being probably the most formidable obstacle to be overcome, still he felt that in an art which was so new and in which there was practically no other proved experience than these successful models to guide him, it was fundamentally important to rigidly adhere to the general design of the successful models, and not to change the design in any particular, except where absolutely necessary, at the same time that the scale of the machine was being changed. While, therefore, many proposals were made and discussed with reference to many of the features of the machine, which it was recognized would need to be changed before it would be thoroughly practicable for war or commercial purposes, still he resolutely brushed aside all such proposals that were not felt by him to be necessary in securing the one first object,—that of enabling the machine to prove the practicability of transporting a human being through the air in controlled flight, by actually doing so under the guidance of such an operator. It is, therefore, to be understood that the Langley Memoir, to which Mr. Brewer refers, was prepared by me in such time as I could spare from an otherwise busy life, after ceasing my connection with the Smithsonian Institution, and that it was not intended as a treatise on the subject of aviation, but merely as an historical record containing such manuscript as Dr. Langley had, himself, prior to his death, prepared, relating to the steam-propelled models, supplemented by a description of what seemed to me to be the more important constructions and tests carried out during the several years that I was associated with him. In fact, the draft of the entire manuscript which I prepared for this publication was completed prior to the Fall of 1907, but owing to the extreme pressure of other matters which could not be postponed, I was unable to complete the review and proof-reading and release the manuscript for publication until I again took it up, in 1911, after a lapse of four years. The period of time, therefore, between the actual carrying-on of the work and the writing of the manuscript record of it was not so great as would be supposed from the fact that the volume was not published until 1912.

It had been my hope and ambition, on closing up the work of Dr. Langley in 1904, as stated in the Langley Memoir referred to, to personally provide the necessary funds and to personally make a further test of the machine to demonstrate that it would fly successfully, exactly as it was attempted to fly it in 1903, and thus achieve what Mr. Brewer very aptly describes as "one of the most dramatic events in the history of aviation". However, fortune did not smile on me to the extent to enable me to personally meet the expense which such a demonstration would involve, and, consequently, I was very much pleased in 1914 when I learned that Dr. Walcott had arranged for the Langley machine to be tested by Mr. Curtiss at Hammondsport. Unfortunately I was not present at any of the tests of the Langley machine at Hammondsport, and, therefore, did not have the satisfaction of seeing it fly equipped with its original motor and carrying a load of approximately forty per cent more than we had burdened it with in 1903. However, I did see the machine itself when I visited Hammondsport on June 30, 1914, and was most bitterly disappointed to find not only that in rebuilding the wings such portions of the structure as had had to be supplied to supplement the spare parts which we had remaining after the second trial in December 1903 were so crude and the wings so roughly assembled that it seemed hardly possible that the machine would be expected to fly with such crude and poorly assembled wings, but that the engine and transmission and propeller shafts had been so greatly abused by attempting to run the engine without having it in proper adjustment, that I was more than ever surprised that the machine would fly under such conditions carrying even its original weight, much less its greatly increased weight, as well as greatly increased head resistance, which had been added to it in mounting in on pontoons.

From what I did learn when I was at Hammondsport on June 30, 1914 from personal interviews with various eye witnesses of the tests which had previously been made of the machine, I was convinced, however, that the machine had been successfully flown for short intervals on several occasions previously, and that this had been accomplished in spite of the fact that at no time had the original Manly motor, with which it was equipped, been operating at anything like the power that it was capable of giving, as shown by the previous tests in 1902 and 1903, this lack in power being due solely to the improper adjustment of the engine and its being equipped with a carburetor which was either not suited to it, or not adjusted to give the best performance. When I left Hammondsport on this visit of one day only, I was assured that the defects in the adjustments of the engine would be remedied and the ball bearings on the transmission and propeller shafts, which had been damaged, would be repaired before further tests were made with it. I later understood, however, that the engine was removed, and a Curtiss engine substituted in order to avoid both the danger of damage to the original engine and the delays which it was feared would be encountered. In keeping the ball bearings of the transmission shafts in proper repair, and that as the original engine had already demonstrated its ability to successfully propel the machine, such further tests as were desired in connection with the study of the machine aerodynamically could be accomplished more expeditiously with an engine driving a single propeller without the use of gearing, etc. required by the original engine and its dual propeller arrangement.

Referring now, more specifically to the criticisms which Mr. Brewer has made under the heading, "Original Langley Flying Machine, 1903", Mr. Brewer's statement in the third paragraph under this heading that the evidence which he was presenting "is only a part of the evidence in my possession" is very apt indeed, for it is quite apparent that in attemping to prove his point he has deliberately suppressed part of the evidence which he had in his possession. For example, he has quoted in full from the Langley Memoir the statement which I made to the Associated Press, immediately after my emergence from the water and return to the houseboat, following the launching of the machine on Oct. 7,



SAMUEL PIERPONT LANGLEY

1903, but has not quoted what is stated in the Memoir—that, "although his (my) first inclination was not to make any statement (regarding the test) until a complete examination could be made to determine both the cause of the lack of success, and, also, the extent of the damage which had been sustained by the machine, yet, owing to the great pressure brought to bear by the press representatives, who said that unless some statement was given out, they would write their own conclusions as to the cause of the mishap, he (I) finally gave out the following statement"—the statement which he quotes. Nor, has Mr. Brewer seen fit to quote you the immediately succeeding paragraph which reads as follows:

> "After recovering the machine the foreman of the workmen (Mr. Reed) (who together with Mr. McDonald were the only ones on top of the boat when the launching actually took place), busied himself to discover what had caused the jerk to the machine at the moment it was released, which had been immediately followed by the great depression of the front end. After some little time he discovered that the upright guide at the extreme front of the launching car (which, as heretofore stated, was slotted to receive a metal lug projecting from the end of the guy-post, and thus prevent the front end of the frame work from being twisted by a side wind striking the machine while it was still on the launching car) had been distorted, the metal cap on it being stretched out of shape in a way which indicated that the pin of the front guy-post had hung in the cap, and that the guy-post was not therefore free from this part of the car when the end of the launching track dropped. The shock which the writer felt at the moment of launching and which had also been seen by others to occur was thus conclusively shown to have been due to the falling track, dragging the front end of the ma hine down with it. As the machine was travelling forward and the car had been almost instantly brought to a standstill by its buffer pistons co-acting with the buffer cylinders at the foot of the track, this front guy-post had been pulled backward, and thus not only pulled the main guy-wires of the wings backward and thereby depressed the front edge of the front wings so that they had no angle of inclination, but had also bent the front end of the metal framework downward,—effects which were discovered from the later examination of the frame and the guy-post itself. From the instantaneous photographs which were obtained, indisputable evidence was obtained that this was

what actually occurred. Referring to the photographs, Plate 95, which was taken by Mr. G. H. Powell, Secretary of the Board of Ordnance and Fortification, and which shows the machine just a few feet in front of the point where it was actually launched, it will at once be seen that the front end of the frame is bent downward and that the front guy-post instead of being parallel with the rear one has been deflected backward at the lower end through an angle of thirty degrees. Referring further to the photograph, Plate 96, which was taken at the same instant as the one just described, it will be seen that even this one, which is a view of the machine as it passed almost directly over Mr. Smillie's head, most clearly shows the extreme extent to which the front wings had been distorted, the rear edges of the wings near the frame having been twisted up until they struck the cross-frame, and the outer ends being free to twist had been forced up very much higher."

****

Mr. Brewer's supposition that I did not feel, or remember, until some years later, the shock experienced in launching, is quite in keeping with the many inaccuracies of statement which he has made in the paper, as could be very easily demonstrated, were it desirable to do so, by the testimony of a number of those who were present at the time and with whom I discussed the matter while we were investigating the cause of the machine having pitched downward at such a sharp angle when it was launched.

Referring to Mr. Brewer's comments on the second launching of the Langley machine on Dec. 8, 1903. Mr. Brewer has not seen fit to even mention that, although the conditions at the moment of launching had become so bad, due to the fact that the houseboat, which could not be controlled by the tug boat which was lashed to it, was veering rapidly under the combined influence of a strong tide and a strong counter wind, and that this combined with the lateness of the hour and the river being full of floating ice, made it most hazardous to attempt to launch the machine, still, owing to the depletion of the available funds and the feeling that it was „then or never", as explained fully in the Langley Memoir, I decided to take a chance. It was, no doubt, a grave error in judgment, but under the stress which existed at the time it was, perhaps, human, if not pardonable.

What really occured in the second test I have set out to the best of my ability in the Langley Memoir. It may be briefly summarized into the statement that with the boat swinging first in one direction and then in the other, as it was under the counter influence of the wind and tide, the machine was caught, while running down the launching track, by a wind gust striking it from a direction that it was not any more prepared to meet, or designed to meet, than many later and unquestionably successful machines, which have been wrecked by wind gusts on a flying field, and that the large tail rudder at the rear dropped down at its rear end to the track as the machine was running along it, and that this pulled the entire machine down into the launching car at the moment of launching so that both rear wings were destroyed along with the rudder, and the right-hand front wing, and probably the front guy-post, were similarly damaged, as the bowsprit is seen very clearly in Plate 5 to be bent down somewhat as it was in Plate 3.

****

There is no foundation for Mr. Brewer's statement that "there were several perfectly good reasons why the wings could collapse under any conditions of the launching". He cites as one of these reasons an alleged weakness of the cross ribs of the wings as shown in the sand loading tests, for which the deflection figures are given in the Memoir, and states that "when a sand load of only twenty per cent above the flying stress was imposed, most of the ribs were bent from twelve to thirteen inches out of shape." He does not in any way distinguish the difference between flexibility and weakness. Dr. Langley's method of development was not to guess at anything, or depend on mathemetical computation, where exact data could be procured by tests. It was for this reason that he devised, many years before I was associated with him, the scheme of loading the wings with sand to predetermine not only whether they were strong enough to stand the loads which it was known they would have to meet, but, also, to determine whether the change in contour was sufficient to interfere seriously with their effectiveness as supporting surfaces. Dr. Langley insisted most strongly at all times on the wing structure being kept as flexible as possible without such flexibility militating too greatly against their effectiveness. His opinion was that if the wings were too rigid in the early experiments, it would result in the machine being much less stable, and his great concern at all times was to minimize, as far as possible, the danger of a fatal accident occuring in the early trials before the operator had become sufficiently experienced to be able to manage the machine effectively. His greatest concern at all times was longitudinal stability, and he felt that this must be automatically maintained, certainly until the operator became quite experienced in controlling the machine. He insisted, therefore, that the wings for the large machine, especially at their trailing edges, should have practically the same degree of flexibility in proportion to their size as the wings of the successful models had. The cross ribs while, therefore, flexible to the extent shown by the deflection figures in the sand load tests, were not weak, but even stronger in proportion to the load they had to carry than those of the successful models which had not only shown no weakness in flight, but had not even been broken in many of their landings on the water. The wings on the quarter-size model which flew on Aug. 8, 1903 were proportioned in all their parts with reference to the corresponding parts of the large machine in exact accordance with the relative weights of the two machines, and there was certainly no weakness apparent in this quarter-size machine. A number of very clear photographs of it in flight are given in the Memoir.

In discussing the position of the guy-posts and the center of pressure on the Langley machine, Mr. Brewer makes the statement, "Mr. Langley had made no measurements to locate the center of pressure of small angles." He thus asserts as a fact what is untrue. For several years before I became associated with Dr. Langley he had been making a very thorough study, by actual tests, on the whirling table of the position of the center of pressure of a score or more different shapes of curves supporting surfaces, a large number of these being indicated by the letter "T" in Plate 48 of the Memoir where they are shown hanging on the wall in the background of the picture. Furthermore, in the Memoir, in describing the supporting surfaces, I have stated that the main rib (or wing beam) was placed at approximately the point where the center of pressure of the wings was at their flight angle of ten degrees, and that this main rib was located at about forty per cent from the leading edge of the wing. The reason the guy-posts were located as they were on the large machine was solely and only because they had been located at this point on the small machines, and that shop tests of both machines had shown that the system of guying was thoroughly strong and effective.

Mr. Brewer has made great point of the fact that the camber of the wings of the Langley machine in the Hammondsport test was not the same as that of the wings in the tests of 1903. I have clearly stated in the Memoir that the wings for the large machine were originally made with a one and eighteen camber, and that later when the rib construction was improved and the wings, which were finally used in 1903, were made in 1900 the front extension, or leading edge was added, which changed the camber to one and twelve to make these wings more nearly a duplicate of the wings of the steam-driven model which had flown in May, 1896 instead of like those of No. 6 which had flown on Nov. 28, 1896, as they were originally planned to be. Both of these wing curves had given very good results on the whirling table tests, and Dr. Langley favored the one and twelve camber and ordered it used in the final wings. It is quite certain that, aside from the greater cost of building the wings with this front extension, there would have been no particular difference in the results of the Hammondsport tests had they been so built. I am quite certain that any unprejudiced observer, who could have seen the Langley machine as it was rigged up at Hammondsport with the heavy floats attached to it and with the heavy, cumbersome system of rough struts and braces used in attaching it to the pontoons, would not have thought that it stood as good a chance of making a successful flight, using the crudely constructed wings with which it was equipped, as it would in exactly the condition obtaining in the tests in 1903, or as it now is in the National Museum in Washington.

Owing to the very brief time available between the receipt of the advance copy of Mr. Brewer's paper and the close of the last mail which will enable these comments on it to reach London by October 20, it is impossible to attempt to go into Mr. Brewer's paper in more detail. I will only add, as I have always stated and do affirm, that the accident in the test of Oct. 7, 1903 was due entirely to the hook on the end of the lower front guy-post catching in the launching car, and that but for this accident a successful flight would, no doubt, have been achieved on Oct. 7, 1903. I have always and do still maintain that the accident to the machine on Dec. 8, 1903 was due to its being caught in a squally wind, which, under the influence of the counter force of the tide and wind, caused the houseboat to swing around in such a way that the machine was subjected to stresses which it was not expected that it would be subjected to, nor necessary that it be subjected to, in order to give it a test in free flight, and that the machine, exactly as it existed in December, 1903, was thoroughly capable of making a successful flight and demonstrating that it was the first machine constructed in the history of the world capable of successfully transporting a human being through the air and being properly controlled in such flight.

The tests of Hammondsport certainly demonstrated that the machine was capable of doing more than had ever been expected of it in the matter of carrying weight, and that the original engine with which it was equipped not only furnished sufficient power to enable it to carry its original weight, but also a greatly increased weight requiring considerably more than fifty per cent more power than the original weight required, and that the claim is thoroughly well founded that it was the first machine built capable of safely transporting a human being through the air and being properly controlled in such flight.

Dr. Charles D. Walcott's Comment

Dr. Charles D. Walcott's comment on Mr. Brewer's paper is in full as follows:

With reference to the paper of Mr. Griffith Brewer on which you are so obliging as to request my comment, I regret very much that having been inaccessible in the field until October 9 I have not had time to take up the matter as thoroughly as I would have liked to do.

I take pleasure in saying at the start that the Smithsonian Institution fully recognizes the well deserved success of the Wright brothers in being the first to make actual flights in heavier-than-air power propelled machines. This recognition of the Institution was among the earliest to make in a formal manner by an award of merit. This being so, I am not prepared to concede that the Wrights were the first to construct such a machine capable of such flight.

Mr. Brewer appears to claim:

1. The Hammondsport experiments were made for Curtiss' ends at Curtiss' expense.
2. The changes made in guying the wings were indispensable to prevent their collapse.
3. The changes made in the engine were indispensable to make it run.
4. The changes made in the propellers were indispensable to give them sufficient thrust.
5. The changes made in the form of the wings were indispensable to flight.
6. The changes made in the rudder were indispensable to flight.
7. The Hammondsport tests of the original machine did not result in flight but merely in hops.

Mr. Brewer is misinformed in regard to some points, and I think imparts a false impression regarding others. I take up the points in the order just given.

1. I quote from my letter to Mr. Curtiss of March 31, 1914:

"In connection with the reopening and development of work under the Langley Aerodynamical Laboratory, it seems desirable to make a thorough test of the principles involved in the construction of the Langley heavier-than-air man carrying flying machine, especially the question as to the tandem arrangement of the planes, and general stability, especially longitudinal stability.

****

"After my recent conference with you, I am writing to say that there will be an allotment of $2000 made from the funds of the Langley Aerodynamical Laboratory for the purpose of conclusively testing the Langley machine and the principles involved in its construction. If you care to undertake such experimentation, will you not answer at your earliest convenience. All materials connected with the original machine will be placed at your service for the purpose."

The Smithsonian Institution has still on file Mr. Curtiss' receipt for the payment made him in accordance with the above proposal.

II. Photographs show that in the original tests of the Langley machine, October 7, 1903, one pair of wings stood up wholly without appearance of collapse after the machine took the air at full speed. Moreover, in the test of October 7, 1903, the photographs show that the other pair was only slightly changed, and this change occurred for a very well attested reason, quite other than from their lack of efficient guying.

Mr. Brewer, in ignoring what follows on the same page, quite unfairly, as it seems to me, quotes Mr. Manly's first statement to the newspaper reporters who beset him even before he was out of the water and who had to be pacified. Mr. Brewer should recognize that the succeeding well-

considered statement by Manly and Langley after investigation of the causes of the failure of the test is the only one deserving of weight:

"After recovering the machine the foreman of the workmen (Mr. Reed) [who together with Mr. McDonald were the only ones on top of the boat when the launching actually took place], busied himself to discover what had caused the jerk to the machine at the moment it was released, which had been immediately followed by the great depression of the front end. After some little time he discovered that the upright guide at the extreme front of the launching car (which, as heretofore stated, was slotted to receive a metal lug projecting from the end of the guy-post, and thus prevent the front end of the framework from being twisted by a side wind striking the machine while it was still on the launching car) had been distorted, and the metal cap on it being stretched out of shape in a way which indicated that the pin of the front guy-post had hung in the cap, and that the guy-post was not therefore free from this part of the car when the end of the launching track dropped. The shock which the writer felt at the moment of launching and which had also been seen by others to occur was thus conclusively shown to have been due to the falling track, dragging the front end of the machine down with it. As the machine was travelling forward and the car had been almost instantly brought to a standstill by its buffer pistons co-acting with the buffer cylinders at the foot of the track, this front guy-post had been pulled backward, and thus not only pulled the main guy-wires of the wings backward and thereby depressed the front edge of the front wings so that they had no angle of inclination, but had also bent the front end of the metal framework downward,—effects which were discovered from the later examinations of the frame and the guy-post itself. From the instantaneous photographs which were obtained, indisputable evidence was obtained that this was what actually occurred *****

"After completing the recovery of the machine and the examination as to the extent of the inquiries it had sustained, and finding unquestionable evidence that the accident had been caused by the front guy-post hanging in its guide block on the launching car, the workmen were set to work straightening out and arranging the various parts, fittings and accessories, and cleaning up the engine which fortunately had sustained no injury whatever. After a consultation in Washington with Mr. Langley, who had been unable to be present at the experiment, both concerning what had already occurred and also what should be done regarding the future of the work, and in view of the fact that the statement which the writer had given to the press representatives, immediately after the accident, had been made before there had been time to make an examination of the machine itself, it was decided that it would be best to give to the press a short statement to correct the earlier one, and Mr. Langley accordingly made public the following note:

"'Mr. Langley states that he was not an eye witness of the experiment at Widewater yesterday, having been detained in Washington by business, but that on the report of Mr. Manly, immediately in charge, he is able to say that the latter's first impression that there had been defective balancing was corrected by a minuter examination, when the clutch, which held the aerodrome on the launching ways and which should have released it at the instant of the fall, was found to be injured.

"'The machinery was working perfectly and giving every reason to anticipate a successful flight, when the accident (due wholly to the launching mechanism), drew the aerodrome abruptly downward at the moment of release and cast it into the water near the house-boat. The statement that the machine failed for lack of power to fly was wholly a mistaken one'".

In view of these facts, I believe the photographic evidence of Langley's own tests of the great machine show that Mr. Brewer is wrong in maintaining that the Langley wings lacked efficient guying to prevent their collapse.

But one who knew Langley's work and the enormous mass of still unpublished tests of the wings, on the whirling table, with sand loading, and otherwise, and the experiments on lift, center of pressure, and resistance for curved surfaces which occupied Mr. Huffaker many months, knows that Langley and Manly had sound experiments behind all they did and had not neglected to learn either the proper place or the sufficient strength for the guying.

III. The facts about the engine are quite opposite to Mr. Brewer's suggestion. In 1903 the engine ran far better than in 1914. There are many witnesses here who know that it ran with all five cylinders speaking for hours and hours at a time in 1903, delivering the full brake horsepower claimed by Manly. The Curtiss mechanics were unfamiliar with it, Mr. Manly was not present to instruct them until they had materially injured it by their unfamiliarity, and it never worked at Hammondsport anywhere nearly as well as in 1903.

IV. The propellers were cut down at Hammondsport, not because they could not hold up, but because the engine worked so poorly there that it did not run to speed with them. The thrust of the propellers at Hammondsport never exceeded 325 pounds, while in 1903 it was measured over and over again at 450 to 475 pounds with the original propellers.

V. The wings made at Hammondsport were far inferior in workmanship to Mr. Reed's wings. That they lacked the additional supporting surface of the overhang was to save time and expense, not for better design.

VI. Langley's whole energy was thrown to the single aim of making a single flight and a safe landing. He knew well that if this was accomplished the means to continue would be available. Owing to the wreck of October 7, 1903, his means were exhausted before he got a flight. The rudder used in the 1903 tests was, as previous flights with the quarter size models had shown, adequate to guide a flight even without a pilot.

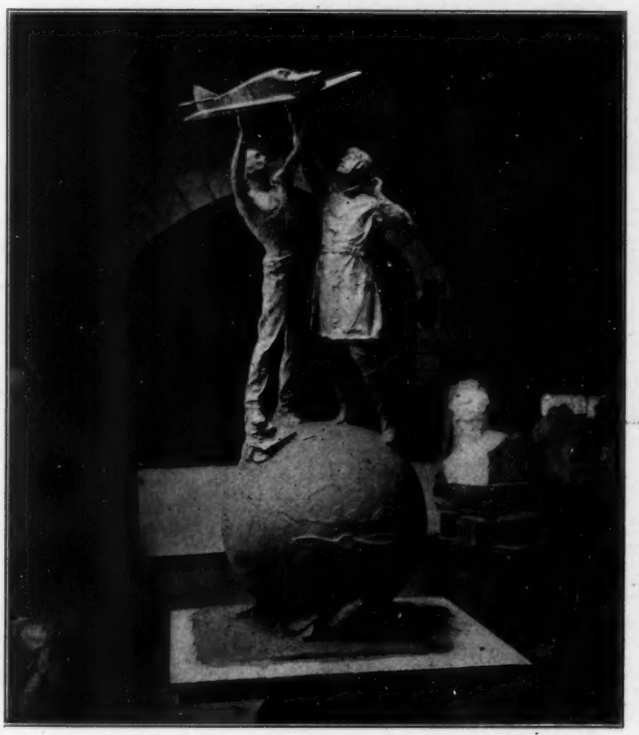
VII. I was present at Hammondsport on May 31, 1914, and saw the machine with the original engine* giving only two-thirds the original thrust and with wings approximately of the original design, but far rougher executed, get under way from rest and fly gracefully, carrying beside a man, over 300 pounds of floats in excess of what the machine was designed to carry. I am still confident that what it did under these relatively adverse circumstances is far inferior to what it was capable of doing in its original condition.

* Mr. Brewer's Figures 1 and 2 are wholly misleading. The earlier flights of 1914 were made with the original engine, the original propellers and original cockpit. The later introduction of the Curtiss engine, tractor propellers, etc., was for the purpose of gaining the further aerodynamical knowledge mentioned in my above cited letter of March 31, 1914.

Conquest of Arabian Desert by Aircraft

Heretofore the Arabian Desert had been regarded as a bar to direct communication between the Mediterranean and the Persian Gulf. Airplanes, instead of crossing it, flew on a semi-circular course round its norther extremities, and so covered many more miles than actually separated the airdromes on its eastern and western sides. The length of the new route is 580 miles, and the line it follows passes through Amman in Transjordania and Kasrel Azark, where there are now landing grounds, and then in an almost straight line crosses the Arabian desert to Ramadie on the Euphrates and leads thence to Baghdad.

The Royal Air Force have carried out the survey. They had the cooperation of the Emir Abdulla in establishing at Amman an advanced base 45 miles east of Jerusalem. There



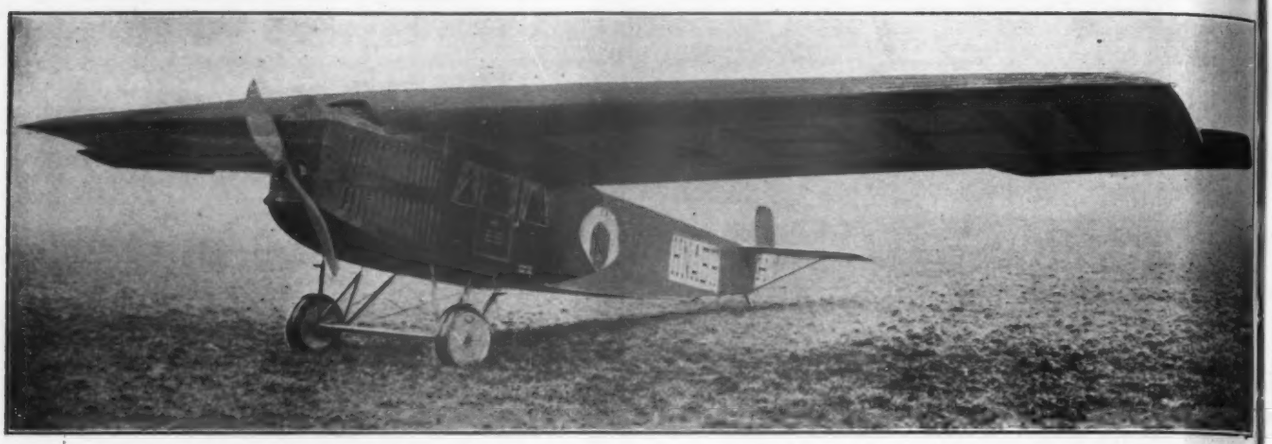
WORKING CAST OF THE LARSEN AERIAL EFFICIENCY TROPHY BY GUTZON BORGLUM

in May was assembled a flight of airplanes, armored cars lent by the British War Office, and desert tenders fitted out with wireless telegraph apparatus.

The locating of the first 150 miles of the route was done with little difficulty. Then the ground parties began to find their work more and more toilsome, until 160 miles from their starting point they struck a vast tract of rough lava beds. Scattered across this tract, which was intersected by deep wadis, were enormous boulders. But a way out of the lava bed had to be found, and when those working on the level were well nigh baffled, and when the growing heat of June added to the hardships under which they labored, news at length came by wireless from the scouting airplanes far ahead that a way out of the wilderness of stone and dry stream beds had been found. That was on June 16. The ground parties forthwith set to work anew and forced a passage through 10 miles of heart-breaking country out into the desert again, where they struck land that was comparatively easy to work. Four days later ground connection was made with Baghdad when the cars arrived at the emergency ground at El-jid, 300 miles from Jerusalem. Operations were pushed on from the Baghdad side, and on June 25 Ramadie was entered by air and land. Baghdad was entered on the following day.

Thus the route was roughly laid out. Work is now going on in perfecting the emergency landing grounds, and in making permanent the ground organization along the track.

The Air Transport Demonstration at Mineola



THE FOKKER F-3 SIX-SEATER CABIN MONOPLANE (220 HP. B.M.W. ENGINE). PAY LOAD, 1050 LB.

With reference to the public demonstration of air transport which the Aero Club of America organized on Oct. 16, at Curtiss Field, Mineola, L. I., considerable interest attaches to the official reports of the Ae. C. A. observers on the performance of the three airplanes entered in this demonstration. These machines were the Fokker F.3 cabin monoplane, entered by the Netherlands Aircraft Corp.; the J.L.6 cabin monoplane, entered by the J. L. Aircraft Corp.; and the Loening Model 23 flying yacht, entered by the Loening Aeronautical Engineering Corp.

Following are the official reports referred to:

Fokker F.3 Monoplane

Oct. 15, 1921

Mineola, New York	*to*	*Providence, R. I.*	*Time*
Leave 9:54¼ a.m.	Arrived	11:34¼ a.m.	100 min.
Providence	*to*	*Mineola*	*Time*
Leave 3:11 p.m.	Arrived	5:31 p.m.	139½ min.

Gas consumed : 35 gal. (at 24c per gal., total $8.40)
Oil " : 4½ " (at $1.00 per gal., total $4.50)

Weight carried:

Pilot B. D. Acosta	180 lb.
Observer W. DeWald	160 "
J. E. Clanson	213 "
G. E. Butcher	132 "
R. E. Bell	154 "
V. E. Scott	205 "
R. B. Noorduyn	145 "
Total weight	1189 lb.

Note. Gasoline tank drain cock open, gasoline invoice shows 24 cents gallon. Oil tank drain cock open, oil invoice shows $1.00 gallon. Put in 6 gal. of oil. Put in 50 gal. of gas.

WM. N. DEWALD
Official Observer.

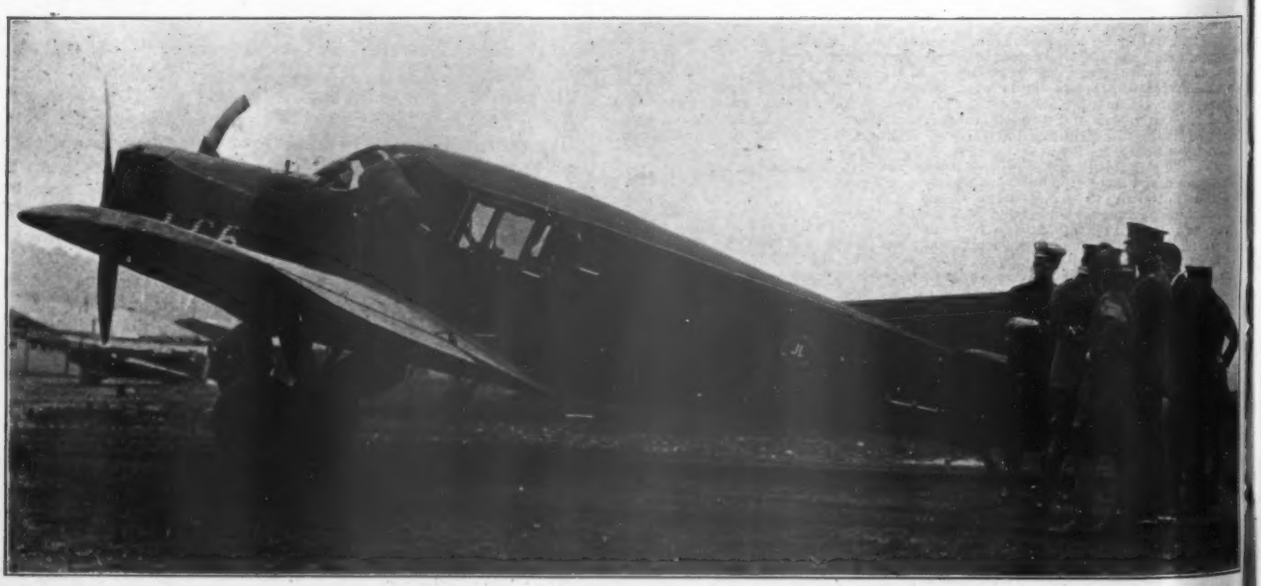
J.L.6 Monoplane

JL-6 all-metal monoplane. Motor B.M.W. 185 hp. Pilot, J. F. Peters. Passengers, seven each flight. Gas, 60 gal. plus 5, total, 65 gal. Oil, 6 gal. Finish, Gas, 11 gal.; oil 3½ gal.

Flight No. 1, out of Hazelhurst Field, L. I.
Leave, 9:00 a.m.
Arrive, 9:25 "
Motor revs., 1320.
Altitude, 1750.
Motor temp., 168 deg.
Air temp., 65 deg.
Mileage, 32 miles.
Passenger weight, 991 lb.
Observations: Air hazy; low clouds; visibility fair.

Flight No. 1 return from Miller Field, S. I.
Leave, 9:45 a.m.
Arrive, 10:06 "
Motor revs., 1290.
Altitude, 1550.
Motor temp., 160 deg.
Air temp., 70 deg.
Mileage, 32 miles.
Passenger weight, 991 lb.
Observations: Sea fog, 800 ft., coming in; low clouds; no wind; visibility fair.

Flight No. 2, from Hazelhurst Field, L. I.
Leave 10:30 a.m.
Arrive 10:52 "
Motor revs., 1325.



THE J.L.6 SIX-SEATER CABIN MONOPLANE (185 HP. B.M.W. ENGINE)

Altitude, 2000.
Motor temp., 165 deg.
Air temp., 75 deg.
Mileage, 32 miles.
Passenger weight, 1152 lb.
Observations: Clearer and warmer; sunshine; heat haze lifting.
Flight No. 2, return from Miller Field, S. I.
Leave, 11:15 a.m.
Arrive, 11:38 "
Motor revs., 1290.
Altitude, 1800.
Motor temp., 168 deg.
Air temp., 75 deg.
Mileage, 32 miles.
Passenger weight, 1152 lb.
Observations: Light south-east breeze, low clouds, fog lighter, lifting.
Flight No. 3, out of Hazelhurst Field, L. I.
Leave, 12:30 p.m.
Arrive, 12:52 "
Motor revs., 1280.
Altitude, 1950.
Motor temp., 170 deg.
Air temp., 80 deg.
Mileage, 32 miles.
Passenger weight, 1125 lb.
Observations: Warmer and clearer, heat haze still evident, clouds lifted, air smooth.
Flight No. 3, return from Miller Field, S. I.
Leave, 1:15 p.m.
Arrive, 1:40 "
Motor revs., 1290.
Altitude, 1950.
Air temp., 80 deg.
Motor temp., 170 deg.
Mileage, 32 miles.
Passenger weight, 1125 lb.
Observations: Fog fine and lifted, light S-E Wind, sunshine, Bumps over Jamaica.
Flight No. 4, out of Hazelhurst Field, L. I.
Leave, 2:00 p.m.
Arrive, 2:24 "

	Left New London	4:20		
	Arrived Port Washington	5:23½	63½	100
	Total		333 min.	600miles

RESUME

The railroad time for this distance is about three hours. The Loening Flying Yacht covered the distance regularly in less than one-third of this time. Total amount of fuel consumed — 120 gallons of gasoline and 6½ gallons of oil. Cost of operation of Loening Flying Yacht—

120 gal. of gasoline @ .26	$31.20
6½ " " oil @ 1.12	7.28
Depreciation (figured on $10,000 plane, 400 days' life, works out at $25 per day)	25.00
Services of pilot	10.00
Services of mechanic	5.00
Overhead on fixed charges	10.00
Total	$88.48

Receipts for operation, charging first-class railroad rates (railroad ticket from New York to New London being $6.02, which works out at about 5c per passenger mile); accordingly 600 miles with 4 passengers equals 2400 passenger miles, or $120.00
Against the above mentioned expense of 88.48
Leaving a profit per unit per day of $ 31.52

Pilot, C. W. WEBSTER Aero Club Observer, MAJ. W. G. SCHAUFFLER

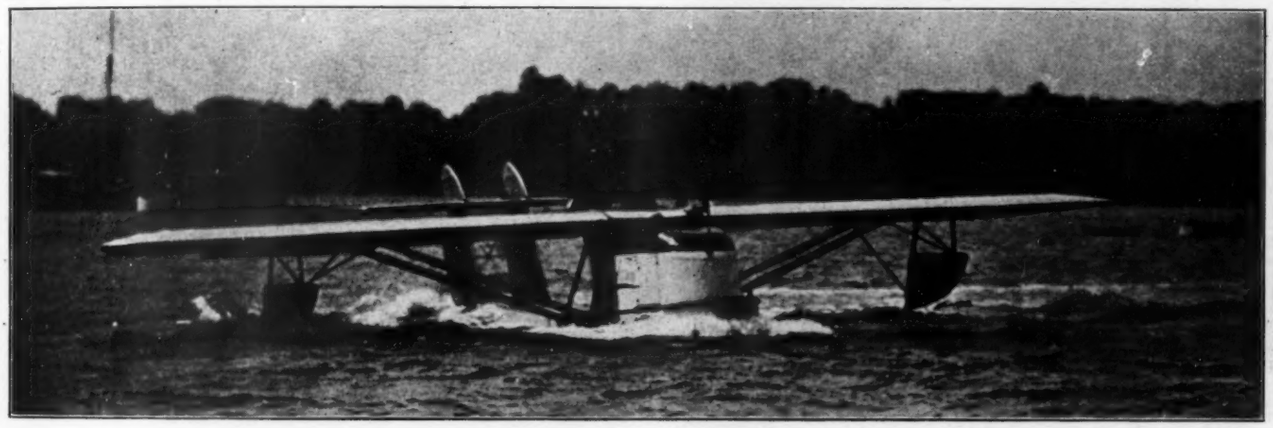
OCTOBER 16, 1921

ROUTE TAKEN

Airplane hangars, Port Washington, to Yacht, ARGUS, JR., anchored off National Gold Club, Southampton, Long Island, a distance of 78 miles.

TIME OF TRIPS

			No. of Minutes	No. of Miles
First Trip —	Left Port Washington	9:30		
	Arrived Southampton	10:12	42	78
	Left Southampton	10:13		
	Arrived Port Washington	10:55	42	78



THE LOENING MODEL 23 FIVE-SEATER FLYING YACHT (400 HP. LIBERTY ENGINE)

Motor revs., 1260.
Altitude, 2100.
Motor temp., 170 deg.
Air temp., 85 deg.
Mileage, 32 miles.
Passenger weight, 1044 lb.
Observations: South-east breeze (15 m.p.h.) no fog, light heat haze, bumpy.
Flight No. 5, out of Hazelhurst Field, L. I.
Leave, 2:30 p.m.
Arrive, 2:52 "
Motor revs., 1350.
Altitude, 2000.
Motor temp., 170 deg.
Air temp., 80 deg.
Mileage, 32 miles.
Passenger weight, 1039 lb.
Observations: Air clear, no clouds, visibility fair, no bumps.
Flight No. 5, return from Miller Field, S. I.
Leave, 4:15 p.m.
Arrive, 4:41 "
Motor revs., 1300.

Loening Model 23 Flying Yacht

OCT. 14, 1921

ROUTE TAKEN

Airplane hangars, Port Washington, to dock of New London Ship & Engine Company, New London, Conn., a distance of 100 miles.

TIME OF TRIPS

			No. of Minutes	No. of Miles
First Trip —	Left Port Washington	9:50		
	Arrived New London	10:39	49	100
	Left New London	11:00		
	Arrived Port Washington	12:02	62	100
Second Trip —	Left Port Washington	12:35		
	Arrived New London	1:22	47	100
	Left New London	1:37		
	Arrived Port Washington	2:39½	62½	100
Third Trip —	Left Port Washington	3:16		
	Arrived New London	4:05	49	100
Second Trip —	Left Port Washington	11:27		
	Arrived Southampton	12:09	42	78
	Left Southampton	12:20		
	Arrived Port Washington	1:00	40	78
Third Trip —	Left Port Washington	1:29		
	Arrived Southampton	2:11	42	78
	Left Southampton	2:27		
	Arrived Port Washington	3:07	40	78
Fourth Trip —	Left Port Washington	3:46		
	Arrived Southampton	4:29	43	78
	Left Southampton	4:30		
	Arrived Port Washington	5:08	38	78
	Total		329 min.	624miles

RESUME

The railroad time for this distance is about 2½ hours. The Loening Flying Yacht covered the distance regularly in less than one-third of this time.

Total amount of fuel consumed—132 gallons of gasoline and 7 gallons of oil. Cost of operation of Loening Flying Yacht·

132 gal. of gasoline @ .26	$34.32
7 " " oil @ 1.12	7.84
Depreciation (figured on $10,000 plane, 400 days' life, works out at $25.00 per day)	25.00
Services of pilot	10.00
Services of mechanic	5.00
Overhead on fixed charges	10.00
Total	$92.16

Receipts for operation, charging first-class railroad rates (railroad ticket from New York to Southampton being $4.81, which works out about 5c per passenger mile); accordingly 624 miles with 4 passengers equals 2496 passenger miless @ 5c or .. $124.80
Against the above mentioned expense of 92.16

Leaving a profit per unit day of ..... $ 32.64·

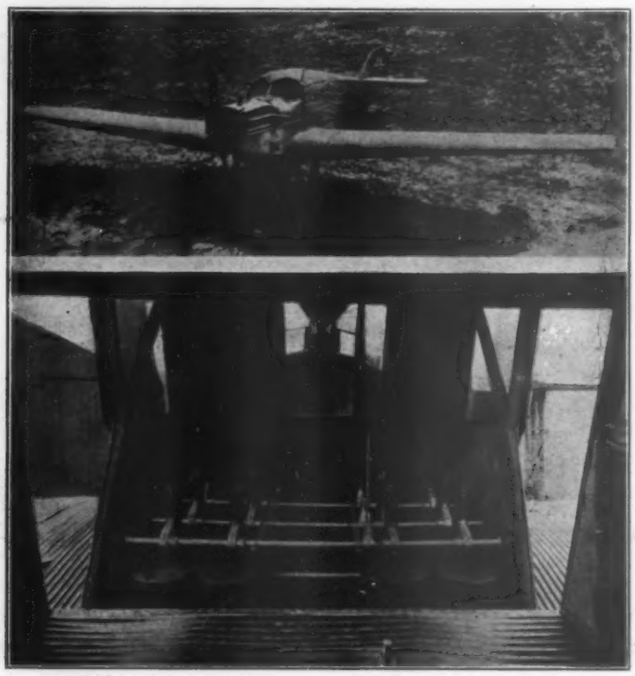
Pilot, D. H. MCCULLOCH Aero Club Observer, BOWDEN WASHINGTON

The J.L.12 Armored Attack Airplane

The latest American airplane designed for military service has just been produced by the J.L. Aircraft Corp., of New York. The machine, known as Model J.L.12, is an armored attack airplane which carries thirty Thompson sub-machine guns disposed in two batteries and in two independent gunners' posts.

General Features

In designing this plane, it was Mr. Larsen's idea to provide a flying machine which, through its high speed, its sensitiveness under control and its ability to climb rapidly, could be used successfully against infantry either on the field of battle



ABOVE: THE J.L.12 ATTACK AIRPLANE. BELOW: THE CONTROL MECHANISM OF THE FORWARD MACHINE GUN BATTERY

or while "going up", or to the rear, or to attack a convoy on a roadway. The machine is intended to swoop down upon the enemy, fly low over him, perhaps at not more than fifty feet from the ground and open up with its battery of machine guns. After such a dash, the machine is to climb swiftly to give the gunner time to adjust new magazines to the guns and then to return to the attack.

The J.L.12 follows in design the general outline of the well-known J.L.6 cabin monoplane which is characterized by all-metal construction and cantilever wings. However, the J.L.12 is built of American made duralumin, produced by the Aluminum Co. of America. The sheet duralumin which covers the wings and the fuselage is 0.025 in. thick, or more than twice the thickness used in the Junkers airplanes.

In the internal bracing of the wings both steel and duralumin is employed. All the vulnerable portions of the airplane are protected by 9/64 in. armor plating, which is capable of resisting machine gun fire from close range.

Armament

The main battery of the plane consists of twenty-eight machine guns arranged in two sections. The first section is of twelve guns located directly behind the pilot's seat, and the second of sixteen guns, is mounted to the rear.

The firing is done by the manipulation of three levers, one firing half the battery, another the other half, the third being a master lever which puts all twenty-eight guns into action with a single motion. The two remaining guns of the thirty are fired at will by the pilot or gunner from the cock-pit. The replacement of fresh magazines for all the guns requires only four minutes.

The forward Thompson guns are set at a slight forward angle, six in the second battery point directly downward and the remainder are trained slightly aft, so that fire from the plane flies in three directions simultaneously.

The circular drums of the Thompson guns contain 100 cartridges and the ammunition equipment for the plane in battle trim consists of three drums for each of the thirty guns, a total of 9,000 cartridges.

Following are the specifications of the J.L.12 armored attack airplane:

SPECIFICATION OF THE J.L.12 ATTACK AIRPLANE

Type of machine	Tractor monoplane.
Purpose for which intended	Ground attack.
Crew	3.
Armament	30 machine guns.
Protective armor	9/64 in. around vitals.
Span	49 ft.
Overall length	32 ft.
Maximum height	10 ft. 4 in.
Engine type and hp.	400 hp. Liberty.
Tank capacity	130 gal.
Weight empty	2900 lb.
Weight loaded	5000 lb.
Performance	
High speed	140-145 m.p.h.
Low speed	55-60 m.p.h.
Climb, 1000 ft.	46 sec.
" 10,000 ft.	11 min.
Range	400 miles.

Progress in Assembling the Airship Roma

The airship Roma, recently purchased by the United States from Italy, arrived at Langley Field in excellent condition in every respect, the envelope which contains the gas coming through in exceptionally fine shape. The envelope is at present inflated with gas, and the keel, which runs along the entire length of the ship is completely assembled, as well as the greater part of the 6-power units.

It is expected that this ship will be ready for its trial flights in this country sometime in November.

The Roma has a range of approximately 3,500 miles at 80 m.p.h. At cruising speed, a distance of 8000 miles is estimated. Its capacity is 1,200,000 cu. ft., length 410 ft., width 82 ft., height 88.6 ft., and useful load in the neighborhood of 19 tons. It is driven by six 12-cylinder, 400 hp. Ansaldo motors. It is contemplated substituting Liberty motors of corresponding horsepower for them at such time as they will require replacement. The ship is of a semi-rigid design, and practically no internal pressure is required to maintain its form under flight conditions.

Upon its entry in service numerous experimental projects in connection with the functioning of the Army Air Service will be carried out, including long-distance reconnaissance flights, photographic missions, coast patrol work, and the carrying of supplies for heavier-than-air units.

Warning to Aviators

The Dayton-Wright Co. notifies that pilots who are accustomed to using No. 2 airdrome at Dayton, Ohio, known as South Field, should take particular caution to avoid a fence which has been erected across the north end of the field. Owing to the existence of this fence the surface area of the field available for landing has been reduced from the original 75 acres to about 40 acres.

Movement of Air Service Troops

Orders have been issued relieving the 1st and 5th Squadrons, Air Service, from temporary duty at Langley Field, Va., and directing their return to Mitchel Field, Long Island, N. Y. These two squadrons present 6 officers and about 75 enlisted men.

Trials of Sperry High Lift Wing

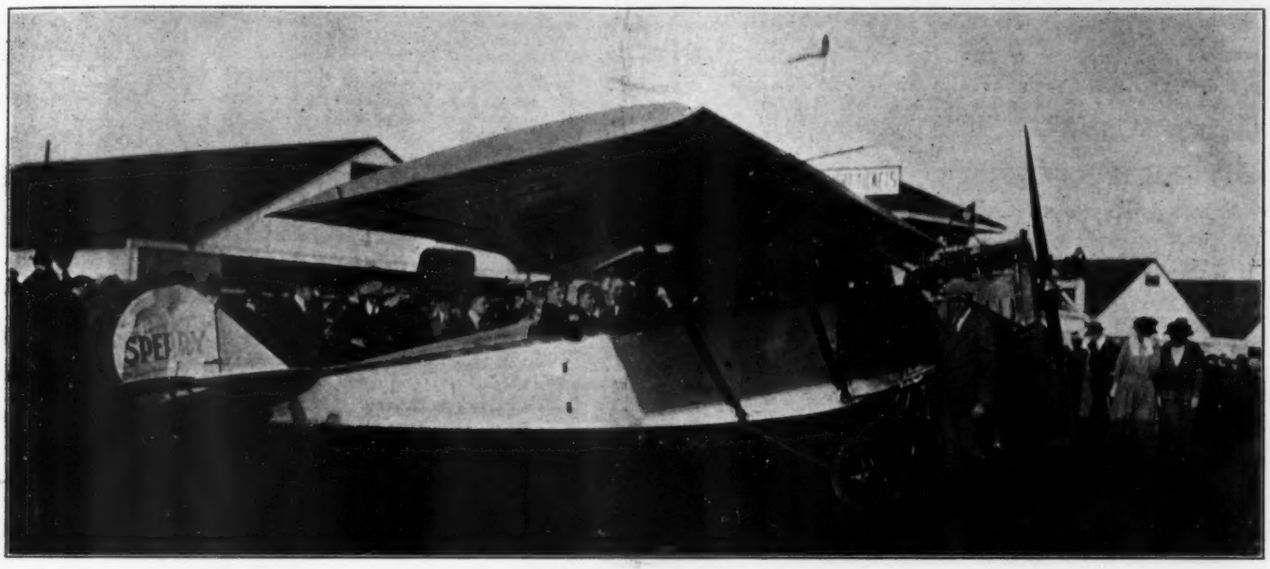
The Lawrence Sperry Aircraft Co. of Farmingdale, L. I., who have designed and built for the commercial market a high-lift monoplane wing, which can be fitted to standard fuselages of the J.N. type, requested the Aero Club of America to witness the trials of such a machine on Aviation Day at Curtiss Field, Sunday, Oct. 16, 1921.

The Aero Club appointed as observers Mr. George W. Furlow and three other members of the club, who all rode in the machine, in addition to the pilot, Lawrence B. Sperry.

The weights carried as officially recorded:

Pilot and 4 passengers	850 lb.
Gas and oil for 2½ hr. and instruments ..	150 "
Total	1000 lb.

After loading the machine as above stated, three Air Service Officers kindly consented to witness the length of run that the machine took in getting off, and after measuring this, it was found to be 300 yd. against a wind of approximately 5 m.p.h.



THE "SPERRY-JENNIE" ON AVIATION DAY AT CURTISS FIELD, MINEOLA, L. I., ABOUT TO TAKE OFF WITH FOUR PASSENGERS AND PILOT

The first test was a climbing test, and the figures recorded by the Aero Club were 2500 ft. in 15 min.

The next test concerned the length of glide, which is one of the features of this machine. The glide with a full load was measured and it was found that the machine glided a distance of one mile and a quarter and losing only 600 ft. altitude.

After this, the speed test was put through between the water tower at Mitchell Field, and the water tower at Westbury, a distance of 1.99 miles, and although the wind was at an angle of approximately 15 deg. to the course, which effected a loss in the average speed. 85.5 m.p.h. was officially registered.

The following official comments were made by the observers of the Aero Club of America:

The machine taxied very well in calm air and also very well with the wind.

The machine does not show a tendency to nose over.

It made a fine vertical bank.

The machine handles very well when taxing with tail skid on the ground.

Description of the Sperry Monoplane High-Lift Wing

The Sperry high-lift wing, as was stated before, is designed to be used on any two place fuselage, where a better all-round performance is desired.

The wing is so constructed that it is absolutely interchangeable from one machine to another. All that is necessary in order to mount it on a fuselage is to remove the four fuselage cabane strut fittings and replace them with special fittings supplied by the manufacturer. These fittings in turn take the Fokker type of struts.

The wing is internally braced and in one piece, completely free from external bracing wires, thus permitting very easy and quick erection and dismounting. Setting up the wing is such a quick and simple operation that it is practically impossible to make mistakes; there is no truing up or other delicate adjustments, so that highly skilled riggers are unnecessary. The wing is built up with very strong deep I beams, with solid spruce web and ash cap strips. The ribs are built up with 3-ply veneer with spruce caps, and the leading edge is spruce. The wing is covered with doped and varnished linen. It was sand tested standing a factor of safety of 15 before failure, with a deflection of 8 in. at a factor of safety of 6.

PRINCIPAL CHARACTERISTICS OF A CURTISS J.N. EQUIPPED WITH SPERRY MONOPLANE HIGH-LIFT WING ARE:

Span	36 ft.
Length	26 ft.
Height	9 ft.
Wing area	300 sq ft.
Weight empty	1350 lb.
Useful load	800 lb.
Weight loaded	2150 lb.
Maximum speed	85 m.p.h.
Landing speed	42 m.p.h.
Climb with pilot and 1 passenger in 10 min.	7500 ft.
" " " " 4 " " "	1500 "
Radius of action	200 miles

Ansaldo Airplanes at Kansas City and Omaha

Ansaldo airplanes were well represented at both the American Legion Air Derby at Kansas City and the International Aero Congress at Omaha. Two six-seater cabin machines A300-C were entered in the cross-country events at both meets, while four SVA-9's were entered in the speed events—the American Legion Derby and the Pulitzer Trophy Race.

The Aero Import Co. of New York, the American sales agency for these planes, entered an Ansaldo A300-C and an SVA-9 on its own account, in both events while the others are being entered by the Humphries Airplane Co. of Denver, Ralph C. Diggins Co. of Chicago, and Lutz-Manor Fliers of Oshkosh, Wis.

"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

Every week, AVIATION AND AIRCRAFT JOURNAL prints the biographical sketch of men who are prominent in American Aeronautics. These sketches will be published later in pamphlet form. As so many of the officers change their stations often, it is believed that a semi-annual issue will be necessary. In compilations of this character many errors and omissions occur. It will be appreciated if corrections are sent to "Who's Who" Editor.

Frank William Taft

TAFT, FRANK WILLIAM, Lawyer; born, Pittsburgh, Pa., April 7, 1891; son of Dr. Frank Ernest Taft and Jessie (Marion) Taft; married, Villo Adelaide Latcher, Feb. 20, 1918.

Educated: Grammar and high schools, Rochester, N. Y.; B.S. 1913, Colgate University; A.B. 1914, Cornell University; Cornell Law School.

Professional: Attorney at law.

War Service: Commissioned 2nd Lieut. Aviation Section, Signal Corps, Nov. 27, 1917; C. O. and Supply Officer 229th Aero Squadron, Kelly Field; Marine Corps School, Savage Arms Corp, Utica, N. Y.; Supervisor of Instruction, Armour's School and Air Service School of Aerial Gunnery, Wilbur Wright Field; promoted to 1st Lieut., Air Service, Aug. 1918.

Member: Binghamton Club; Cornell Club; University Club; American Legion; Aero Club.

Present Occupation: Attorney at Law.

Address: 706 Security Mutual Bldg.; home, 16 Front St., Binghamton, N. Y.

George Raymond Cullman

CULLMAN, GEORGE RAYMOND, Engineer; born, Jersey City, N. J., May 3, 1896; son of Jacob H. Cullman and Louise Cullman.

Educated: Jersey City Public and High Schools.

Professional: 1911 to 1916, Southern Pacific Railroad Co., N. Y.; June to Nov. 1916, on Mexican Border with 4th Regiment of Militia; Nov. 1916 to April 1917, Southern Pacific Railroad Co., New York, N. Y.

Aeronautical Activities: Received training with Royal Air Force in Canada, Fort Worth, Tex. and England; commercial flying during 1920.

Flying Rating: Reserve Military Aviator.

War Service: Overseas with 166th Aero Squadron, 1st Day Borbardment Group, 1918; Army of Occupation Nov. 1918 to April 1919.

Member: Aero Club of America.

Present Occupation: With Pacific Gas and Electric Co. in California.

Address: Cassel, Shasta County, Calif.; home, 31 Fulton Ave., Jersey City, N. J.

Ralph Pittman Cousins

COUSINS, RALPH PITTMAN, Major, Air Service; born, Mexia, Tex., Dec. 1, 1891; son of R. B. Cousins and Dora (Kelly) Cousins.

Educated: Austin High School, Austin, Tex.; West Texas Normal College; U. S. Military Academy, 1915.

Professional: Cadet, U. S. M. A., 1911 to 1915; Lieutenant of Cavalry, 1915-1916; student flyer, Aug. 1916 to May 1917; Major, Air Service, July 1917 to date.

Aeronautical Activities: Pilot since 1916; command of the S. M. A., Austin, Tex.; First Day Bombardment Group, Kelly Field, Tex.; member Advisory Board, O.C.A.S., Sept. 1920 to Aug. 1921.

Flying Rating: Junior Military Aviator, April 6, 1917; Airplane Pilot, July 1920.

Member: Army and Navy Club (Wash.).

Present Occupation: Stationed at Sheffield Scientific School, New Haven, Conn.

Address: Sheffield Scientific School, New Haven, Conn.

Theodore Gordon Ames

AMES, THEODORE GORDON, Student, born, St. Paul, Minn., Aug. 12, 1898; son of Charles W. Ames and Mary (Lesley) Ames.

Educated: Irving School, St. Paul; St. Paul Academy (Private); A. B. 1920, Harvard College.

Aeronautical Activities: Commissioned 2nd Lieut., Air Service, N. A. with R. M. A. rating at Kelly Field No. 2, May 1918; completed Pursuit Pilot's course at Rockwell Field (including aerial gunnery training) Oct. 31, 1918; Garden City, L. I., N. Y. at time of Armistice.

Flying Rating: Reserve Military Aviator, May 1918.

War Service: Oct. 1917 to Dec. 1918.

Member: Aero Club of America; Harvard Aeronautical Society.

Present Occupation: Student.

Address: 396 Harvard St., Cambridge, Mass.; home, 501 Grand Ave., St. Paul, Minn.

Glenn Hammond Curtiss

CURTISS, GLENN HAMMOND, Airplane Constructor; born, Hammondsport, N. Y., May 21, 1878; son of Frank R. Curtiss and Lua (Andrews) Curtiss; married, Lena P. Neff 1898.

Educated: Public schools of Hammondsport, N. Y.

Professional: Early pioneer work motorcycles and internal combustion engines; champion motorcycle racer; established world's record for single cylinder motorcycles, 1906; established world's record for mile in 26-2/5 seconds equalling 137 miles an hour, record still stands; 1905, G. H. Curtiss Manufacturing Co., builders of Curtiss Motorcycles; 1907 to date, building airplanes, hydroairplanes and flying boats and aeronautical engines.

Aeronautical Activities: 1905, Built engine for U. S. Dirigible No. 1 and assisted Capt. Thomas Baldwin in trial tests; 1907, with Dr. Alexander Graham Bell, assisted in work of Aerial Experiment Association as motor expert and director of experiments; the G. H. Curtiss Manufacturing Co. built the Red Wing, White Wing, June Bug and Silver Dart, with motors designed by Curtiss; July 4, 1908, won Scientific American Trophy in June Bug; 1909, built airplane for Aeronautical Society, the first order placed in U. S. by civilian body; 1909, won Gordon-Bennett Speed Trophy at Rheims, France; instructed in flying many of the earliest government and exhibition flyers; 1910, won N. Y. World prize of $10,000 for flight from Albany to New York; 1911 and 1912, awarded Aero Club of America Trophy; 1911, Feb. 23, accomplished first flight from land to water and water to land on amphibious airplane; 1911, awarded Robert J. Collier Trophy for most signal advance in aviation during year; 1913, presented wth Langley Medal by Smithsonian Institution; 1916, organized Curtiss Aeroplane and Motor Corporation; also Curtiss Engineering Corp., Garden City; during war built large quantities (142 different models) of airplanes, seaplanes and engines for U. S. and allied governments; assisted U. S. Navy in the the design and construction of N C boats.

Flying Rating: License No. 1, Aero Club of America; License No. 2, Aero Club of France.

Member: Aero Club of America and numerous social and professional organizations.

Present Occupation: Designing Head of Curtiss Corporations.

Address: Garden City, Long Island, N. Y.

Edward Grissom Haynes

HAYNES, EDWARD GRISSOM, 1st Lieut., Air Service; born, Edna, Tex., Sept. 25, 1897; son of Willard Calvin Haynes, M. D. and Margaret Haynes.

Educated: Public and high school, San Antonio, Tex.

Professional: S. P. Railroad clerk, 1912-1914; farmer, 1914-1915; S. A. & A. P. Railroad, San Antonio, Tex. 1916-1917.

Aeronautical Activities: Training at various fields, 1917-1919; Test Pilot at Bolling Field.

Flying Rating: Reserve Military Aviator, April 1918; Airplane Pilot, Sept. 1919.

War Service: Air Service, May 1917 to Nov. 1918.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.

John Williams Andrews

ANDREWS, JOHN WILLIAMS, Journalist; born, Bryn Mawr, Pa., Nov. 10, 1898; son of Charles McLean Andrews and Evangeline (Walker) Andrews.

Educated: Taft School, Watertown, Conn.; B. A. 1920, Yale University.

Professional: Journalism, June 1920 to date.

Aeronautical Activities: School of Military Aeronautics, M. I. T., June 1918; transferred to Cornell Ground School on Sept. 7, 1918; Camp Dick, Concentration Camp; volunteered as fighting observer, Oct. 16, 1918; went to Selfridge Field; commissioned as Reserve Officer, Dec. 17, 1918.

Flying Rating: Fighting Observer.

Present Occupation: Journalism.

Address: Peking Leader, Peking, China; home, 424 St. Ronan Street, New Haven, Conn.

Arthur Louis Chetlain

CHETLAIN, ARTHUR LOUIS, Salesman; born, Chicago, Ill., Jan. 21, 1894; son of Judge Arthur H. Chetlain and Lottie Chetlain; married, Marcia F. Wood, May 15, 1920.

Educated: Public schools of Chicago.

Aeronautical Activities: Experimental work on biplane gliders and construction of Nieuport design monoplane, 1910-1913; student aviator at Miami, 1918-1919; commissioned Ensign, 1919.

Flying Rating: Ensign, U. S. Naval Aviation, April 1919.

War Service: Officers Training School; Sea service from Sept. 1917 to June 1918; transferred to Naval Aviation Service; instruction at M. I. T. Ground School, Miami, Fla., and Pensacola, Fla.

Present Occupation: Salesman, Procter & Gamble Co.

Address: 404 Marion Bldg.; home, 5112 Ravenna Ave., Seattle, Wash.

Frederick Hamilton Chetlain

CHETLAIN, FREDERICK HAMILTON, Student; born, Chicago, Ill., May 26, 1895; son of Judge Arthur Henry Chetlain and Lottie Chetlain.

Educated: Eugene Field and Lake View High Schools; Yale University.

Professional: With The Crane Co., Chicago, for four years.

Aeronautical Activities: Extensive Model Aeroplane experiments, 1908-1911; construction of and numerous experiments with practical 18 and 21 foot gliders, 1911-1913; construction of Nieuport Monoplane, 28 foot spread, 1913; Cadet training at Chanute Field; retired to the Reserve, Feb. 2, 1919 as 2nd Lieut.; advanced flying at Payne Field, Sept., Nov. 1918.

Flying Rating: Reserve Military Aviator, July 1918.

War Service: U.S.S.M.A., Cornell University; served in the 7th Provisional Squadron at Camp Dick; completed gunnery course at the Armorers School, Wilbur Wright Field.

Member: Aviation Club of Chicago.

Present Occupation: Student.

Address: 796 Yale Station, New Haven, Conn.; home, 7414 Sheridan Road, Chicago, Ill.

John Francis Chetlain

CHETLAIN, JOHN FRANCIS, Student; born, Chicago, Ill., May 26, 1895; son of Arthur Henry Chetlain and Lottie Chetlain.

Educated: Eugene Field School, 1909; Lake View High School, 1913; Washington State College.

Aeronautical Activities: Experimented with model aeroplanes and conducted numerous experiments with gliders, also assisted in building a power machine, 1911-1912-1913; flying training at Love and Rich Fields, March 1918 to Jan. 1919.

Flying Rating: Reserve Military Aviator, Oct. 26, 1918.

War Service: Sept. 1917 to Jan. 1919.

Present Occupation: Student.

Address: College Station, Pullman, Washington; home, Cedarhurst Vashon Island, Washington.

Kent Gladstone Chetlain

CHETLAIN, KENT GLADSTONE, Student; born, Chicago, Ill., Feb. 13, 1897; son of Judge Arthur H. Chetlain and Lottie Chetlain.

Educated: Eugene Field and Nicholas Senn High Schools; A. B., Northwestern University.

Professional: 1915-1917, Tyler & Hippach Co. (Glass).

Aeronautical Activities: 1908-1911, Experiments with models; experiments with practical gliders, 1911-1912; student aviator, Oct. 1918 to Feb. 1919; commissioned Ensign, March 1919; on active duty at Great Lakes, Ill., 1919-1920.

Flying Rating: Ensign, Naval Aviator No. 2298.

War Service: Ground School at Mass. Inst. of Tech.; training at Miami; active duty at Great Lakes, Ill.

Present Occupation: Student.

Address: 7414 Sheridan Road, Chicago, Ill.

George Merrill Palmer

PALMER, GEORGE MERRILL, 1st Lieut., Air Service; born, Rodney, Ohio, June 24, 1892; son of Thomas Morton Palmer and Alice A. Palmer; married, Susan E. Gaines, May 18, 1918.

Educated: Bidwell Porter High School.

Professional: Five years as experimental mechanic with Hall of Invention, Minneapolis, Minn.

Aeronautical Activities: Student at Mineola, L. I., 1917; Instructor and Stage Commander, Kelly Field, 1917-1918; pilot in 74th Aero Squadron, 1919; on Cross Country with Handley Page plane from Jan. to July 1919; Assistant Chief Engineer, Ellington Field, 1919; Adjutant and Pilot, 1st Day Bombardment Group, Nov. 1919 to Jan. 1920; Engineer Officer of 14th Squadron, Langley Field, 1921; Operations Officer, 14th Squadron, June 15 to date.

Flying Rating: Airplane Pilot.

War Service: 1st Infantry Minnesota N. G., March 1917 to May 1917; Aviation Section, Signal Corps and Air Service, U. S. Army from May 1917 to present date.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.

Harold Franklyn Rouse

ROUSE, HAROLD FRANKLYN, 1st Lieut., Air Service; born, Port Richmond, N. Y., Sept. 28, 1893; son of Franklyn S. Rouse and Carrie C. Rouse; married, Mary Louise Gilbert, Sept. 1, 1919.

Educated: Montclair, N. J. High School.

Professional: 1913-1917, Consultant-Industrial Safety Schedule Rating; 1917 to date, U. S. Army.

Aeronautical Activities: 1917, U.S.S.M.A., Princeton, N. J.; 1918, A. E. F. training with French and American Air Services; 1919, A. E. F. Staff duty with 3rd A. I. C., Issoudun, France; duty with Rents, Requisitions and Claims Service until Sept. 1919; duty at Mitchel Field, 1920 and 1921; duty at Langley Field to date.

Flying Rating: French Brevet, Ecole de Chartres, July 7, 1918.

War Service: Army, 1917 to date.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.

Paul J. Carr

CARR, PAUL J., 1st Lieut., Royal Air Force; born, Roanoke, Va., April 4, 1892; son of George Francis Carr and Margaret (Lee) Carr; married, Helen S. Dolin, June 21, 1921.

Educated: High school and college.

Professional: Federal service.

Aeronautical Activities: S. M. A., Cornell University, June to Aug. 1917; Ground School, Long Branch, Ont., Canada,, 1917; S. M. A., Toronto University; Flight Cadet, Armour Heights and Leaside, Ont., Canada, 1918; School of Aerial Gunnery, Camp Hicks, 1918; training in England, 1918; Flight Commander and Instructor, Lakedown, England, 1919; civilian flying, 1920.

Flying Rating: Airplane Pilot. Certificate, Royal Aero Club of the British Empire.

War Service: R. A. F., France, 1918.

Present Occupation: 1st Lieut., Royal Air Force.

Address: 207 Second Ave., Hinton, W. Va.; home, Waynesboro, Va.

Clifford Cameron Nutt

NUTT, CLIFFORD CAMERON, 1st Lieut., Air Service; born, Kansas City, Mo., July 25, 1896; son of Mr. and Mrs. Alva V. Nutt.

Educated: Public school and Manual Training High School of Denver, Colo.

Aeronautical Activities: Ground School, 1917; Instructor in flying, 1918; Officer in Charge flying, Ellington Field, 1919; ordered to Washington, Officer Chief Air Service, Nov. 1920; Flight Commander, 14th Bombing Squadron, Langley Field to date.

Flying Rating: Reserve Military Aviator, Jan. 1918; Airplane Pilot, April 1920.

Member: Army and Navy Club, Washington.

Present Occupation: 1st Lieut., Air Service.

Address: Kelly Field, Tex.; home, 105 North Indiana Ave., Kansas City, Mo.

Levi L. Beery

BEERY, LEVI L., 1st Lieut., Air Service; born, Salem, Iowa, 1888; son of Enoch Beery and Susie Beery.

Educated: Salem High School; LL.B. 1911, Drake University.

Professional: General law practice three and a half years.

Aeronautical Activities: Ground School, Berkeley, Calif., 1917; training at Call, Love, and Ellington Fields during 1918; Border Patrol, 1919-1920; Langley Field, 1921.

Flying Rating: Airplane Pilot.

Present Occupation: 1st Lieut., Air Service.

Address: Langley Field, Va.

William Alfred Bevan

BEVAN, WILLIAM ALFRED, Captain, Air Service; born, Skewen, South Wales, Great Britain, Dec. 11, 1876; son of Alfred Bevan and Margaret (Davies) Bevan; married, Claire Evelyn Wahrer, Dec. 29, 1915.

Educated: Angus, La. High School; Perry, Iowa Business College; Bachelor of Science, Iowa State College, 1904; Post Graduate work in Physics, University of Chicago, summer terms of 1905 and 1915; 1921, Master of Science, Massachusetts Institute of Technology.

Professional: Instructor in Chemistry, Iowa State College, 1904-1905; High School, Spokane, Wash., 1905; Civil Service, 1906-1909; Instructor in Physics, Iowa State College, 1909-1912; Instructor and Assistant Professor of Physics, Oregon State College, 1912 to 1918.

Aeronautical Activities: U. S. S. M. A., M. I. T., June 1918; Assistant Engineer Officer in charge of the Motor Division, Mather Field, 1918; Engineer Officer, 9th Aero Squadron, on duty at March Field and Mather Field, Aug. 1919 to June 1920; Chief Engineer Officer, Rockwell Field, 1919-1920; Chief Inspector of Airplanes and Motors and in charge of special research, Rockwell Air Intermediate Depot, Rockwell Field, 1920; Student Officer in Aeronautical Engineering and Thermodynamics, M. I. T., Oct. 1920 to June 1921; observer and assistant pilot in the first DeHaviland Airplane to fly from Mather Field to Portland, Ore. and return, June 8 to 15, 1919.

Flying Rating: Reserve Military Aviator, July 1919; Airplane Pilot.

War Service: Nov. 1917 to date; commissioned Captain, Air Service Regular Army, July 1, 1920.

Member: American Association for the Advancement of Science; Society for the Promotion of Engineering Education.

Present Occupation: Captain, Air Service.

Address: Rockwell Air Intermediate Depot, Rockwell Field, Calif.

Robert Clarke Murray

MURRAY, ROBERT CLARKE, Student; born, Smyrna, Asia Minor, Oct. 18, 1896; son of Rev. James Murray, D. D. and Elizabeth K. Murray.

Educated: Gordon's College, Aberdeen, Scotland; White Bear High School, White Bear Lake, Minn.

Aeronautical Activities: 1918, Training as observer in England; 1918-1919, with Royal Air Force as observer; took pilot's training under Lt. Harold G. Peterson; employed by the Harold G. Peterson Aircraft Co. during the summer.

Flying Rating: Flying Observer.

War Service: 1915-1917, Canadian Infantry; 1917-1918, Royal Garrison Artillery; 1918-1919, Royal Air Force.

War Honors: British Military Medal received at Ypres, July 1916; British Distinguished Conduct Medal received at Vimy.

Member: Aero Club.

Present Occupation: Student at University of Minnesota during winter and flying with H. G. Peterson Aircraft Co. during summer.

Address: White Bear Lake, Minn.

Howard C. Brown

BROWN, HOWARD C., Commercial Aviation; born, Moxahala, Ohio, Sept. 15, 1890; son of William R. Brown and Sarah O. (Alton) Brown; married, Martha M. Tibbetts, June 15, 1921.

Educated: Public schools of Ohio and West Virginia; B. S. E. E. 1914, West Virginia University.

Professional: Electrical Engineer for West Penn. Power Co., 1914-1917; designer for S. Diescher & Sons, 1917; designer for Stone & Webster, 1919-1920.

Aeronautical Activities: Princeton Ground School, 1918; flying cadet, Love Field; advanced training at Love Field; bombing course, Ellington Field, 1918; civilian flying, 1919; Air Mail Pilot, July 1920 to date.

Flying Rating: Reserve Military Aviator.

War Service: Army, Nov. 1917 to Jan. 1919.

Member: President, Air Mail Pilots of America.

Present Occupation: Air Mail Pilot, Chicago-Omaha Division.

Address: Air Mail Field, Maywood, Ill.; home, 1626 Kanawha St., Charlston, W. Va.

William R. McCulla

McCULLA, WILLIAM R., Sales Engineer; born, Armagh, Ireland, Dec. 20, 1887; son of Robert McCulla and Marian (Pringle) McCulla; married, Edith Gilmore, June 19, 1920.

Educated: Public school of Belfast, Ireland; Queens College, Belfast, Ireland.

Aeronautical Activities: Aircraft engineer, Packard Motor Car Co., 1916; engineer, Aircraft Division, Willys-Overland Co., Toledo and Toronto, 1917-1919.

Present Occupation: Sales engineer, Bijur Motor Appliance Co.

Address: 58 Garfield Bldg., Detroit, Mich.

Russel Hyde Merrill

MERRILL, RUSSEL HYDE, Chemical Engineer; born, Des Moines, Iowa, April 8, 1894; son of Samuel A. Merrill and Fannie R. Merrill.

Educated: West Des Moines High School; Grinnell College, Grinnell, Iowa; Bachelor of Chemistry, 1919, Cornell University.

Professional: With Crown Williamette Paper Co., 1919 to date.

Aeronautical Activities: Ground School, Naval Aviation Detachment, M. I. T., Cambridge, Mass., Oct. 1917 to Jan. 1918; flying training, Key West, Fla., 1918; Acting Chief Pilot at Cape May during last six months of active duty.

Flying Rating: Naval Aviator No. 469.

War Service: U. S. Naval Flying Corps.

Member: Aero Club of America; American Chemical Society.

Present Occupation: Chemical Engineer.

Address: Crown Williamette Paper Co., Floriston; home, R. F. D. Box 77, Menlo Park, Calif.

Follett Bradley

BRADLEY, FOLLETT, Major, Air Service; born, Fort Omaha, Nebr., Feb. 12, 1890; son of Alfred Eugene Bradley and Letitia May (Follett) Bradley; married, Katherine Rising, Aug. 11, 1913.

Educated: Grammar and high schools; U. S. Naval Academy, 1910.

Professional: Navy, 1906-1911; Army, 1911 to date; three years Ordnance Department; six years Field Artillery; one year Air Service.

Aeronautical Activities: Sent first radio message from the Air Nov. 1912; conducted first Artillery shoot from air, Nov. 1912; learned to fly at Mineola, L. I., 1916.

Flying Rating: Airplane Pilot.

War Service: One year in France with 2nd Division; in all battles of 2nd Division including Aug. 1918.

War Honors: Croix de Guerre with palm and bronze star; silver citation star.

Member: Army and Navy Club (Wash.).

Present Occupation: Major, Air Service.

Address: Post Field, Ft. Sill, Okla.

Sydney Salisbury Breese

BREESE, SYDNEY SALISBURY, Engineer; born, New York City, March 15, 1883; son of James L. Breese and Frances Tileston (Potter) Breese; married, Paula A. Matsner, May 10, 1921.

Educated: Groton School; Harvard University.

Professional: B. L. M. Motor Car Co., 1906-1907; completed first car in 1901; built first successful step hydroplane boat in U. S., 1909.

Aeronautical Activities: Began experimental work with S. S. Pierce, 1914; built monocoque tractor flying boat, 1915; built several small single-seaters in 1915-1916; Chief Engineer, Breese Aircraft Co., 1917-1918.

War Service: Lieutenant (J. G.) U. S. H. R. F. 1918-1919.

Member: Harvard Club; Seawanaka Corinthian Y. C.

Present Occupation: Engineer.

Address: 38 East 23 St., New York City.

Maitland C. Harper

HARPER, MAITLAND C., Architect; born, East Hampton, N. Y., Nov. 29, 1890; son of Wm. St. John Harper and Mary Palmer (Hedderwick) Harper.

Educated: 1915, University of Pennsylvania.

Professional: Architect, 1915-1917; U. S. Army, 1917-1918; Architect, 1918 to date.

Aeronautical Activities: U. S. S. M. A., Cornell University; Park Field, School of Aerial Gunnery; Taliaferro Field, School of Aerial Observers; flying duty at Langley Field, Va.

Flying Rating: Reserve Military Aviator; Pilot Certificate.

War Service: Air Service, U. S. Army, June 1917 to Dec. 1918.

Member: Aero Club of America.

Present Occupation: Architect.

Address: 101 Park Ave.; home, 527 West 121 St., New York City.

Phinehas Putnam Barnes

BARNES, PHINEHAS PUTMAN, Engineer; born, Norway, Me., Sept. 21, 1897; son of Charles P. Barnes and Annie M. Barnes.

Educated: Norway and Houlton, Me.; A. B. 1920, Colby College.

Professional: American Telephone & Telegraph Co.

Aeronautical Activities: Flying cadet, Selfridge Field, 1918.

Flying Rating: Fighting Observer.

War Service: U. S. Air Service.

Member: D. K. E. Club (N. Y.).

Present Occupation: Commercial Engineering Department, American Telephone & Telegraph Co.

Address: 195 Broadway, New York City; home, 31 Park St., Houlton, Me.

Commercial Aircraft for Emergencies

In view of the threatened railroad strike, since called off, the Manufacturers Aircraft Association telegraphed to Secretary of Commerce Hoover a report on the aircraft available for emergency transportation:

"There are at least 750 commercial aircraft immediately available for the general carriage of passengers, mail and express. They are of both land and water, cargo and passenger types. Fifty are in commission in the vicinity of New York. Others in proportion are available out of Boston, Philadelphia, Baltimore, Key West, New Orleans, Kansas City, Dayton, Ohio, Cleveland, Ohio, Chicago, Buffalo, Minneapolis, points in Texas, Los Angeles, San Francisco and Seattle. The aircraft carry from two people, or the equivalent in weight to eleven or twelve, and have a non-stop range of flight from 200 to 800 miles. Arrangements must be made for fuel and service, and advise that municipalities that wish to avail themselves of aerial transportation, place their airports in condition."

The offer to Secretary Hoover was based upon reports now being received by the Association from operators in all parts of the United States. These reports show that there are probably 1,200 commercial aircraft, stationed in every part of the country, but it is thought only about two-thirds of these are suitable and available for cross-country flying.

The fifty or more planes in Greater New York are in commission on the various fields on Long Island and New Jersey.

The Aeromarine Plane and Motor Co. offers six eleven-passenger, twelve six-passenger and five three-passenger flying boats available at Keyport, N. J., and Key West, Fla.

The Curtiss Aeroplane and Motor Corp. has twenty, two and three-place land machines ready at Garden City, and reports that their depots, in all parts of the country, have several hundred more of similar types tuned up for flight.

The Loening Aeronautical Engineering Corp., whose Flying Yacht has recently been operating between New York and New London at less cost than the cost by rail, is ready for Boston, Philadelphia or Washington service.

Lawrence Sperry has in commission his five-passenger high-lift wing Curtiss J.N. monoplane, the Messenger and a score of Avros.

The Wittemann Aircraft Corp. of Hasbrouck Heights, N. J., reports four land planes. The Wittemann company incidentally received telephone instructions from the Post Office Department to rush completion of five DeHavilands for the Air Mail. These DeHavilands can carry six or seven passengers or 850 pounds of mail.

The J.L. Aircraft Corp. has five J.L. monoplanes at Central Park, L. I., each carrying six people. These planes are to leave shortly for the middle west, but will be available in Kansas City or Omaha or can be recalled to New York or sent wherever needed.

At Curtiss Field on Long Island there are three or four five-passenger S.V.A. land planes of the Aero Import Corp., and two Fokker monoplanes of the Netherlands Aircraft Co., one carrying five passengers. These ships are already in service.

Reports from over the country state that the Thomas Morse Co. at Ithaca, the Glenn L. Martin Co. at Cleveland, G. Elias & Bro. at Buffalo, the Dayton Wright Co. at Dayton, Ohio, and the Boeing Airplane Co. at Seattle are ready to provide service, and wherever possible to put more machines in the air. The Dayton Wright Co. has three long range cruisers, one of which carries four passengers, and which is in frequent operation between cities of the middle west. Two lines, one land and one water, operate in conjunction with the Boeing Co. out of Seattle. The seaplane line connects with Victoria, B. C.

Particularly extensive service can be provided out of Kokomo, Ind., where there is a large air port with fifteen or twenty machines, Minneapolis with twenty-five or thirty, and San Francisco and Los Angeles. In the two latter cities the California-Curtiss Co., the Mercury Aviation Co. and the Rogers Airport have available a hundred planes of various types.

Aerial transportation will fill the demand for the urgent movement of negotiable banking paper, checks, etc., the clearing of which will relieve the financial system; it will meet to a great degree the problem of carrying the mails. The Air Mail, now operated only between New York and San Francisco, has contact between New York and the South by way of Washington and could, if advisable, operate two more lines between New York and Chicago, taking in Pittsburgh, Ft. Wayne, etc. The equipment exists and the route is charted between the Twin Cities and St. Louis. Air travel is so common on the Pacific Coast that movement of the mails by airplane between San Francisco and Los Angeles is practicable at once. The Seattle-Victoria mail could be extended south to Portland and east to Spokane and Minneapolis.

The same types of airplanes capable of carrying the mails can also transport limited quantities of food, but it is believed that the greatest service will be in providing service to government officials or business men on whose travel from point to point may depend the working out of other problems, such as motor transport or the increased utilization of the water ways. Although no united national effort has been made, airways have been laid out over most of the United States, and there are enough of the seventeen thousand pilots in training to man the ships available.

Kansas Fliers and the Railroad Strike

The Aviation Committee of the American Legion Executive Committee wired to Postmaster General Will Hays offering the services of the entire membership of the Flying Club of Kansas City in recruiting pilots for the United States air mail service reserve planes which the Postmaster General is quoted in Washington dispatches as saying he would put in service if the threatened railway strike ties up mails sufficiently to warrant such action.

Commercial Aviation in Hawaii

The *Star-Bulletin* of Honolulu is favorably impressed with the possibilities for the successful operation of commercial aerial transportation in Hawaii, stating that the conditions, climatic and geographical, are ideal in this group of islands for an all-the-year airplane service. Storms of great severity are extremely rare, and each island offers its haven of peaceful, protected ocean water for seaplanes which, of course, are the types of flying machines best adapted for inter-island service. It believes that the transportation of the mails, express and passengers, should give to a commercial airplane service sufficient business to make the venture profitable and, if not at the outset, at least as soon as a period of successful operation convinced people of it practicability. Army and Navy airmen who have made many inter-island flights are virtually unanimous in the opinion that a commercial service is feasible. It is they who have done the flying, the blazing of the air trails, so to speak.

French Airplane Construction

A London financial journal states that the French Military Air Service will next year have over 40,000 airplanes, if the Army Budget passes. The French Flying Corps would then be composed of 286 regiments, each of twelve squadrons. French airplane constructors are at present in a very strong position, mainly because the French Government did not cancel all its war contracts, but allowed constructors to execute the greater number of them. It was thought that this would be the best way of subsidizing the French air industry.

In addition, the French constructors had in hand substantial orders from Japan and South America. It is to this policy and to the most intelligent cooperation of the French military technical services with civilian aviation that France owes her present lead in the air.

Third Aviators' Armistice Dinner

The third Aviators' Armistice Dinner will be held this year in the large banqueting hall of the Commodore Hotel, New York, on the evening of Nov. 11, 1921, at 7 p. m. Tickets for the dinner will be $7.50 and they may be secured from the Armistice Dinner Committee, Aero Club of America, 11 East 38th Street, New York.

This is the annual reunion dinner of all the Air Service Officers from all over the United States to fight over again the battles of the clouds.

Those wishing to attend are requested to indicate the organization with which they desire to be seated, either Squadron, Flying Field Group, R.A.F., French, Italian, Balloon, Naval Stations, S.O.S., or civilians.

Uniforms will be worn.

Steps will be taken by the Committee this year to place this annual reunion of war aviators upon a permanent basis. For this purpose an up to date record is to be kept of the names and addresses of all American Aviators who took part in the war. The past Armistice Dinners have demonstrated the fact that the majority of the pilots who assemble at these reunions in New York come from out of town. Philadelphia, Washington, Baltimore and Boston send large delegations and even the remote cities of Detroit, Cleveland and Chicago are well represented at each dinner. Individuals from California and Texas, and indeed from every State in the Union have returned year after year to meet their former squadron mates in New York and to talk over the old days in France.

In no other branch of the service did such fraternal comradeship survive the war as exists among the airmen. To preserve this fraternity all aviators and their friends are invited to attend these annual reunions.

There will be no speaker's table and no speech making, beyond the uncontrolled buzzing of a thousand spontaneous speeches going on simultaneously, in which each speaker is his own toastmaster.

The Committee in charge of the third Aviators' Armistice Dinner are: Benedict Crowell, chairman; Laurence L. Driggs, Lt. Col. H. E. Hartney, Eddie W. Rickenbacker, Cole Younger.

The Blimp as an Observation Balloon

At the Army Balloon School at Ross Field, Arcadia, Calif., a second test was recently made of using a Pony Blimp as an observation balloon by means of attaching a cable. The Blimp was allowed to rise to a height of 1000 ft. and showed marked improvement over the initial trial as an observation balloon.

The test clearly indicated that the motorized observation balloon has great possibilities. It is believed by many airship pilots that the Blimp will soon supplant the observation balloon, as it will be able to remain stationary over a given point by means of a cable. When it is desired to change position this may be done by hauling in the cable and flying to another point. Further tests will be made in the near future.

Operation of Forest Patrol

A report from the Air Officer of the 9th Corps Area, summarizing the forest fire patrol activities for the entire season of 1921 up to September 1st, gives the number of fires discovered as 832; the number of patrols, 396; number of miles covered, 148,113; number of square miles observed, 7,230,459; flying time 561 hours and 50 minutes; and the number of planes in commission, 47. The patrol bases were located at Camp Lewis, Wash.; Eugene, Oregon; Mather Field, Mills, Calif.; Corning, Calif.; and Visalia, Calif.

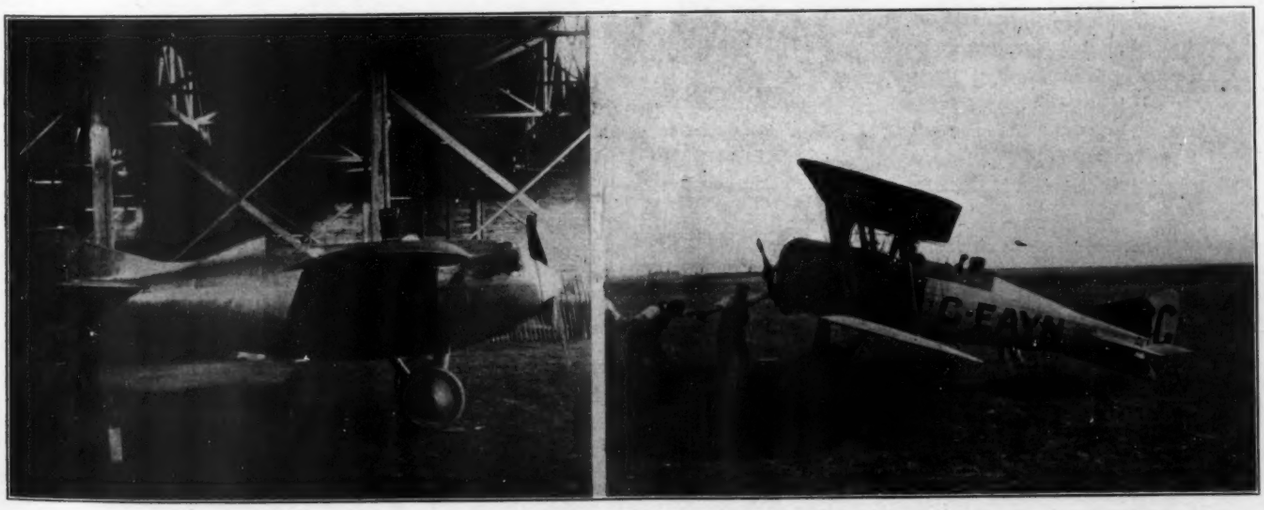
Due to the rainy season having begun, patrols in the States of Oregon and Washington were discontinued on Sept. 10, after having completed a very successful season, despite the shortage at times of gasoline and oil, necessitating the temporary suspension of operations.

Aviation Activities at Spokane

The development of interest in aviation has proceeded steadily in Spokane, Wash., and vicinity. In one day recently there were ten planes on the Foster Russell landing field. They included the machines of Fred W. Hungate, a banker and wheat grower of Pomeroy; Albert Hubbard, a Spokane inventor; Charles E. Stilwell, theatre owner; J. G. Rankin, pilot, Walla Walla; W. H. Fouts, an attorney of Walla Walla; David Mathews of Moscow, Idaho; Spokane Industries, C. L. Langdon, pilot; Ralph Beal, Ritzville; and the Bluebird and Standard planes of the Russell Co. Half of the visiting planes were flown by their owners or operators.

Four men are employed in setting up a new 3-passenger plane for use on the field. It will be of 150 hp., equipped with an electric starter, and will be ready for the air shortly.

Two Interesting Foreign Airplanes



LEFT: HANRIOT HD-22 ALL-METAL RACING MONOPLANE. RIGHT: GLOUCESTERSHIRE "SPARROW-HAWK" (200 HP. BENTLEY) OF THE TYPE SUPPLIED TO JAPAN

Photos C. G. Grey

Applying the Figure of Merit

By Donald W. McIlhiney

In the article entitled "Single-Engined Cabin Airplanes" a Figure of Merit was calculated for each machine. Various comments have been received regarding both the Figure of Merit and some of the data. The following brief notes may serve to make the matter clear.

In the original article* it was pointed out that there are many factors that can not be included in a practical F. M. as they are not readily determined or can not be expressed by a number. The most important of these is the maintenance cost which naturally requires a service test for its determination and so can not be employed to rate a new design. Another important feature is the factor of safety of the structure. A high F. M. may be obtained by employing a very low factor of safety and so making the machine relatively unsafe as compared to another machine with a lower F. M. but greater structural strength. Reliability is still another point that can not be included while first cost can be fairly included only by dividing it by the value received which is the F. M. itself; furthermore, at the present stage of progress, prices are not readily obtained for the majority of new construction.

Some misunderstanding was shown as to the purpose of the F. M. Some considered that it was intended to be an *engineering* instead of a *commercial* formula. The formula was intended to give a rating to the commercial value, i.e., the the dollars and cents value, and not to the engineering value of the design, which is a different proposition. It has been proposed that the formula be improved by eliminating the engine, which could be accomplished by assuming the same weight per horsepower and fuel consumption for all designs.

In any machine the F. M. may be varied by changing the disposable load and the proportion of fuel load to pay load. Taking D = Disposable Load, e = Fuel Consumption (lb./hp.-hr.), Hp = Horsepower, h = Endurance in hours, and

$$\frac{V_{\text{90 per cent max}}}{V_{\text{landing}} \times Hp.} = K$$

we have a new expression for the F. M. as follows

$$\text{F. M.} = K \times (D - heHp) \times (Vh)$$
$$= KDVh - KVh^2eHP$$

The F. M. will be a maximum for that value of h which makes the first derivative zero, as follows:

$$\frac{dFM}{dh} = KDV - 2KVeHph$$

$$h = \frac{D}{2eHp}$$

Substituting in the original equation,

$$\text{FM} = \text{K} \times \left(\frac{D}{2}\right) \times \left(\frac{D}{2} \times \frac{V}{2eHp}\right) = \text{a maximum.}$$

Or in words: The F. M. for any given machine will be a maximum when the pay load is equal to the fuel load, other factors remaining constant including the total weight. When the disposable load, and hence the total weight, is varied, a similar calculation shows that the F. M. increases indefinitely as the weight is varied, within practical limits of course.

Most foreign F. M.s or Indices of Efficiency assume a fixed range and the speeds of the various machines are considered to be approximately equal, the idea being to assume that they are all employed on the same airway. This eliminates the designer's opinion as to the proper proportion of pay and fuel loads. This we hold to be a mistake, especially in view of the fact that the assumption of a common range will vary the ratings of the different machines compared in an unequal manner and may even *increase* some while *decreasing* others. The two most prominent foreign F. M.s are M. Herbemont's "pounds pay load per horsepower" and the Italian "Pay load × range / weight of fuel and oil". In the first case the range is fixed and in both the speed is assumed to be sensibly the same for the machines considered together. Both of these are strikingly similar in conception with the one here considered with the exception that we have included the landing speed. This is included because it is a measure of the depreciation and, to a lesser extent, the maintenance cost for the following main reasons: It is the principal determining factor of the amount of damage done in a forced landing on unprepared ground and it is a measure of the wear and tear involved in taking off and landing, both for the machine and the pilot, at the regular airports.

As the table given on page 421 of the Oct 10 issue of this journal contains the data for some representative machines we are reproducing it here with some necessary corrections and additions.

As M. Herbemont is a member of the Blériot firm it is to be supposed that his figure for the horsepower of the Mammouth (1000) is correct although the machine has hitherto been understood to have been fitted with four 300 hp. Hispano-Suiza engines. Also the Spad S-33 has been understood to be fitted with a Salmson Z9 engine which is rated at 250 hp. and normally develops much more.

The table gives some added items to be considered in comparing the cantilever monoplane with the trussed biplane. Also it shows that while the Fokker and Spad are better airplanes (gliders), than the Junkers, the qualities of the engine with which the latter is fitted make it the best machine when

* See AVIATION AND AIRCRAFT JOURNAL, Vol. IX, p. 254, Nov. 8, 1920.

TABLE OF CHARACTERISTICS OF COMMERCIAL AIRPLANES

TYPE	Junkers J-13	Zeppelin E. 4. 520	Bleriot Mammouth	Fokker F3	Spad S-33
Total horsepower	185	1040	1000	220	245 (250)
Wing area sq. ft.	417	1140	2448	452	456
Weight empty lb.	2317	13360	11000	2640	2310
Useful load lb.	1288	5340	7260	1760	2200
Weight loaded lb.	3605	18700	19260	4400	4510
Wing loading lb./sq. ft.	8.64	16.4	7.86	9.75	9.89
Power loading lb./hp.	19.49	17.98	19.26	20.00	18.48 (17.04)
Speed m.p.h.	111	132	93	105	118
Disposable load / Weight loaded per cent	31.2	26.9	36.0	36.4	45.2
Pay load as designed	655	1776	3426	1050	1150
Pay load at 310 miles	890	3200	4290	1185	1452
Pay load per hp. at 310 miles	4.81	1.71	4.29	5.38	5.92 (5.81)
L/D*	7.21	7.07	5.97	7.00	7.24 (7.096)
F. M. as designed	6246	3669	3119	5038	(5074)
F. M. at 310 miles	3823	2174	3339	4301	4660 (4567)

* $L/D = \frac{W \times V}{375 \times Hp \times 0.8}$

a longer distance is to be covered. By *best* is meant the best in a commercial sense, though not necessarily in an engineering sense. In comparing the Fokker and the Spad as examples of monoplane and biplane it is well to take into account that if both machines were equally well streamlined, the advantage would very probably be in the favor of the cantilever monoplane.

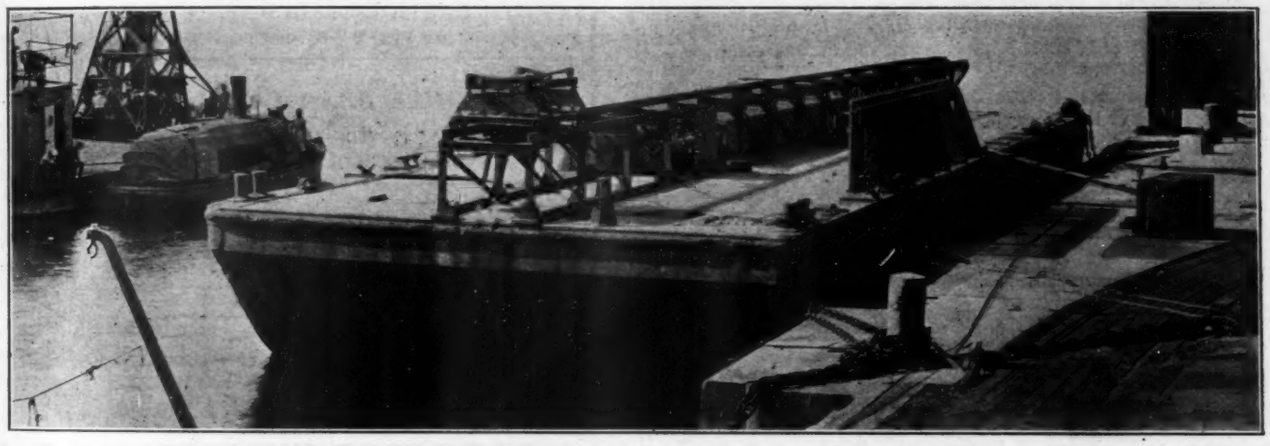
In applying any F. M. in judging a group of machines, not only must the factors of the type mentioned above be considered, but some specific requirement such as speed or range must be employed to weed out those machines not designed for the service required. A fuller explanation of this point with a figure was given in the original article to which interested readers are referred.

The power of the B.M.W. 3a engine is 185 hp. at all altitudes up to 10,000 ft. There is a widespread impression, due to a premature and erroneous English report, that this engine develops about 240 hp. at ground level. This is only obtained by using full throttle and with the altitude control wide open. This is not the manner in which the engine was designed to be used and such treatment would soon ruin it. The 220 hp. B.M.W. engine is the type 4.

New Naval Catapult Launching Device

The Secretary of the Navy announces that, as the result of extensive experiments, the U. S. Navy has developed a "catapult" launching service which is soon to be tested in service. A complete unit is now ready for installation on a battleship of the fleet. When all necessary tests are completed in service, the "catapult" can be produced in quantity, and ships rapidly supplied with this new aviation equipment.

The catapult consists of a carriage, moving on tracks, on which is mounted the airplane. By means of the motive plant used, the carriage is caused to move on the tracks at an increasing acceleration until, near the end of the tracks, its speed is sufficient to permit the airplane to take the air. Then the carriage is brought to rest by means of suitable brakes and shock absorbers. Such apparatus can be made in varying sizes so as to be adapted to the launching of any aircraft which it is likely to desire to use from surface ships.



AN EARLY CATAPULT LAUNCHING APPARATUS DEVELOPED BY THE U. S. NAVY, AND TESTED FROM THE DECK OF A BARGE AT PENSACOLA, FLA.

Official Photo, U S. Navy

Normally when an airplane takes off from the flying field, it runs along until it has attained a speed through the air sufficient to sustain it aloft. This is known as its minimum flying speed. The length of run necessary is dependent upon the type of plane concerned and its loading, the wind, and the nature of the terrain.

In case of a very lightly loaded airplane, such as a single seater pursuit machine, taking off up-wind, the length of run required before leaving the ground would be very short. However, as a rule, the length of run required is considerable, and under unfavorable conditions it may be several hundred feet. For the purpose of supplying this starting speed from the ships the "catapult" has been developed.

When an airplane is launched from the deck of a battleship by means of a catapult, the machine naturally cannot land on the deck of the vessel at the end of the flight. Thus planes which will be used from battleships must possess some means of flotation. At the end of a successful flight, they will alight on the water in the lee of the ship and be hoisted on board by suitable cranes. In the case of planes which are operated from proper aircraft carriers, they may be launched by means of catapults from the carriers, or under favorable circumstances they may take off directly from the flying-off deck of the carriers as from a field. Also, at the end of their flight they may alight on the landing decks of the carriers where they will be brought to rest gradually by means of the arresting devices which are in course of development.

In the absence of the catapult during the recent past, in the endeavor to launch airplanes from battleships, platforms have been built on the tops of turrets and supported by the muzzle of the guns. The turret is so trained as to point the platform directly into the virtual wind. Under favorable conditions, it was found possible to launch small lightly loaded aircraft. However, such a system was very undesirable as the apparatus was heavy, cumbersome, and interfered with the turret on which it was used. As the airplane was not locked to the platform while it was attaining flying speed, a side gust was liable at any time to cause a serious accident.

The catapult as being developed will be built into the ships which are to use them, and will be so installed as not to interfere with any other part of the ship. It is conceivable that in the near future, all surface ships will be equipped with such catapults with their aircraft as they are now equipped with small boats. By a system of tracks the airplanes will be run from their hangars onto the upper decks of the surface ships, onto the carriages of the catapults.

Normally, while the ships are cruising or in bad weather, the planes will be kept under cover on the upper decks, some disassembled and some partly assembled. Up to the present, due to the fact that aircraft are of such a recent development, in putting them on ships, the apparatus necessary for them has not been "built in." The battleships of the future will be designed undoubtedly to take their catapults, necessary hangar space and machine shops, the tracks, and their aircraft, just as they are now designed to take their turrets, guns, and other equipment.

Foreign Aeronautical News

Czecho-Slovakia

The progress made in Prague in aerial transport since its inauguration there last February is striking. Daily services of airplanes connect Prague with Paris, Strasbourg and Warsaw, while the next few months will see the city linked with Budapest, Belgrade, Bukarest, Constantinople, Dresden and Berlin. During February only three persons made the journey from Prague to Paris by air. By June the figures had risen to seventy-six for the month. The Franco-Roumanian Air Navigation Company has some forty airplanes in service, some of which carry five passengers, together with their baggage. This company has already conveyed over 500 passengers and so far not a single mishap has been recorded. In the transport of parcels, newspapers, etc., still more rapid progress has taken place. In February 16 lb. of parcels were conveyed; in June, exclusive of newspapers, some 7,000 lb. were carried. In February the quantity of newspapers taken by air was some 3 lb. weight. By June this had grown to a little more than 1½ tons weight.

For the extension of the air services to Constantinople a large type of airplane is on order. It will possess four motors with 1,200 hp. and will be fitted for the accommodation of sixteen passengers with the baggage. It is to attain an average speed of 120 m.p.h.

China

For the purpose of maintaining peace and order of airdromes the Aeronautical Department has recently organized an Airdrome Police Training Corps, which consists of 160 men divided into four groups commanded by a commander-in-chief. The work of this new organization was completed on June 1.

The Aeronautical Department has engaged four new pilots from England and America for service in connection with the Pekin-Shanghai air service. These pilots are Captains Jones, McMullin, Campbell, Orde and C. H. Dolan.

The five students sent by the Aeronautical Department to England to study airplane construction have completed their courses after one year's hard study. Three of these students have been assigned to the Tsin-ho aircraft factory, where technical experts are needed. The remaining two were ordered to America to continue their studies in military aviation.

France

An engineering firm in France, according to the Paris *Echo*, has just completed an amphibian airplane which will carry six passengers, this plane being intended for the London-Paris service, and will come down on the Thames and the Seine. Service between the rivers of the two capitals has long been under consideration, saving as it would nearly an hour in the time taken for the journey from London to the heart of Paris. It is more than probable that by next spring a Thames-Seine airway will be inaugurated.

A DH9 airplane belonging to the British DeHaviland Aircraft Co., making a tour of Europe, recently reached Paris after a remarkable flight covering a distance of 4,250 miles. The airplane left London in August and went first to Paris and then. by way of Brussels, Hamburg, Copenhagen and Stockholm, to Christiana. Returning to Copenhagen, it then flew to Berlin, Warsaw, Prague, Vienna, Venice and Milan, reaching Paris by way of Mimes. The tour was completed without a mishap and on schedule time.

Roumania

The Roumanian minister of communications has been authorized to sign a contract with a French company, the Cie Franco-Roumaine de Navigation Aérienne, under which the company has the right of air transport in Roumania on the Paris-Strasburg-Prague-Vienna, Budapest-Belgrade-Bucharest-Constantinople air route over a period of twenty years. The agreement carries with it an annual maximum subsidy of 6,500,000 lei to the Company in return for certain guarantees, including the placing of its material and personnel at the disposal of the Roumanian government in the event of mobilization.

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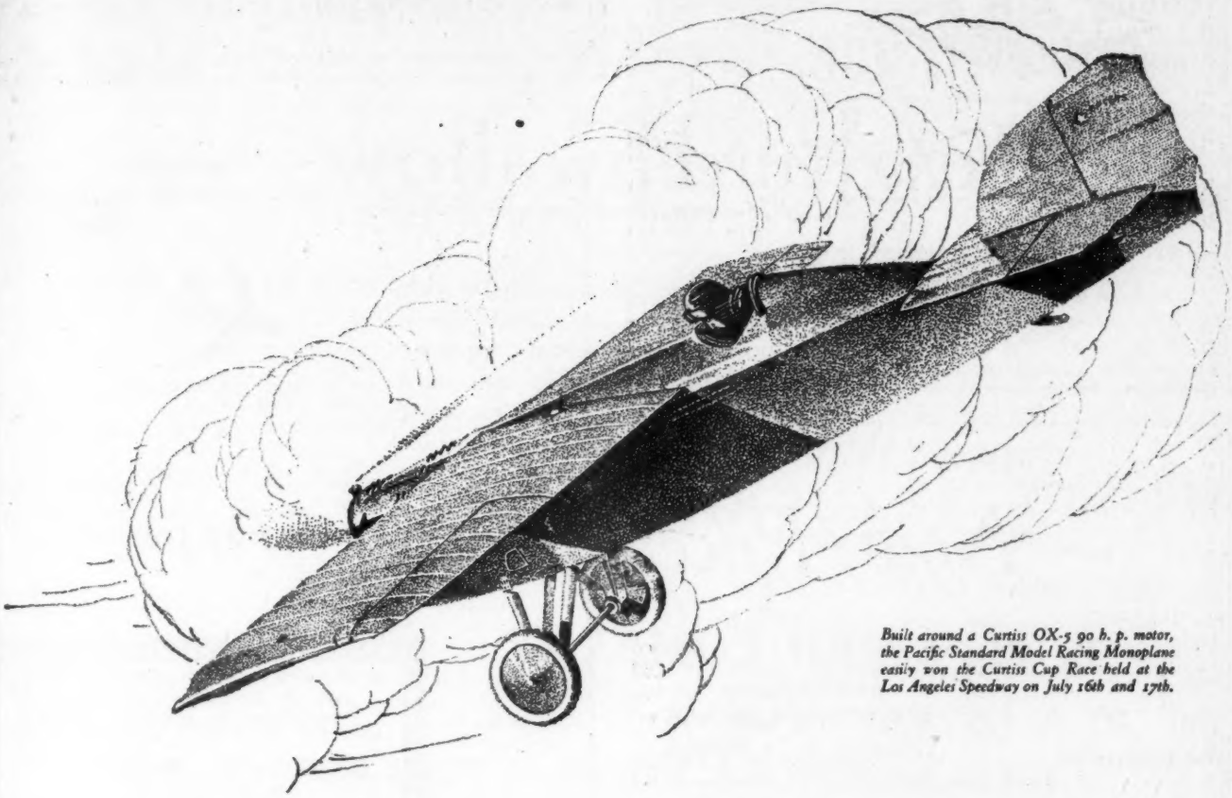

Built around a Curtiss OX-5 90 h. p. motor, the Pacific Standard Model Racing Monoplane easily won the Curtiss Cup Race held at the Los Angeles Speedway on July 16th and 17th.

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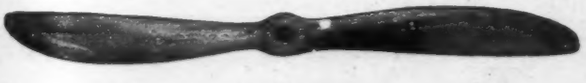

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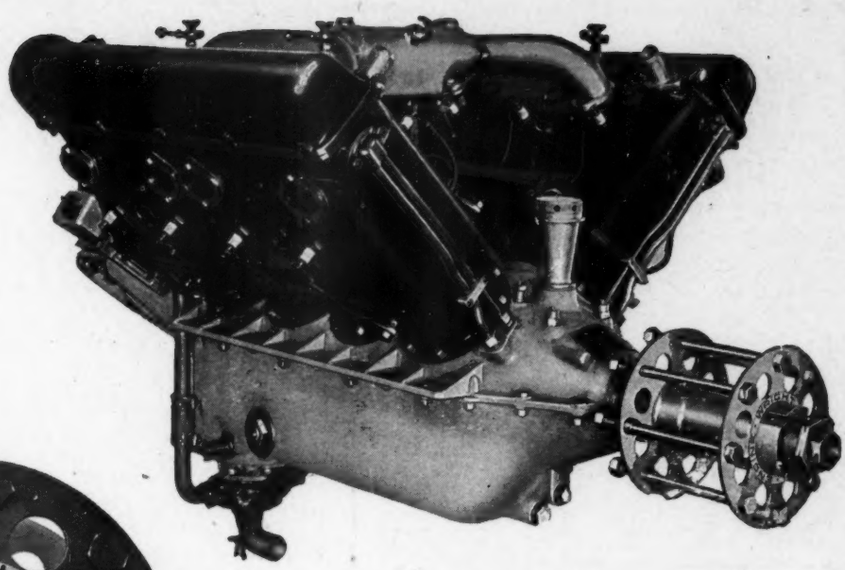

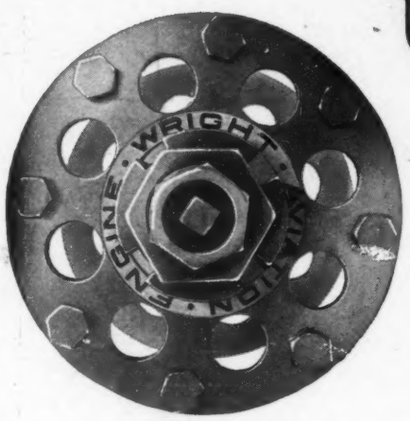

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